A RETROSPECTIVE STUDY ON PRESCRIPTION PATTERN AND MEDICATION ADHERENCE FOR GLAUCOMA MANAGEMENT, METROEYES CLINIC IKOYI AS A CASE STUDY.

BY

EZEIFEDUBA IFEANYICHUKWU

DANIEL

LSC1804324

DEPARTMENT OF OPTOMETRY

FACULTY OF OPTOMETRY

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IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF DOCTOR OF OPTOMETRY (O.D) DEGREE

NOVEMBER, 2025.

CERTIFICATION

This is to certify that this research project titled: **(A RETROSPECTIVE STUDY ON PRESCRIPTION PATTERN AND MEDICATION ADHERENCE FOR GLAUCOMA MANAGEMENT, METROEYES CLINIC IKOYI AS A CASE STUDY)** was carried out by **(EZEIFEDUBA IFEANYICHUKWU DANIEL)** in the Faculty of Optometry, University of Benin in partial fulfillment of the requirement for the DOCTOR OF OPTOMETRY (OD) degree in the 2024/2025 Academic Session.

……………………………….	…………………………….
DR. (MRS.) SARAH EBUWA	**DATE**
(PROJECT SUPERVISOR)	
………………………………….	…………………………….
DR JUNO O. OKUKPON	**DATE**
(PROJECT COORDINATOR)	
………………………………….	…………………………….
PROF. (MRS.) EKI OGHRE	**DATE**
(DEAN FACULTY OF OPTOMETRY)	
……………………………	……………………………
EXTERNAL EXAMINER	**DATE**

APPROVAL FOR THE SUBMISSION OF BOUND PROJECT

This is to certify that the student **"EZEIFEDUBA IFEANYICHUKWU DANIEL"**, with the project topic titled **"A RETROSPECTIVE STUDY ON PRESCRIPTION PATTERN AND MEDICATION ADHERENCE FOR GLAUCOMA MANAGEMENT, METROEYES CLINIC IKOYI AS A CASE STUDY"** has effected all the necessary corrections given by the external examiner and is approved for submission: in partial fulfilment of the requirement for the award of **DOCTOR OF OPTOMETRY (O.D)** degree in 2024/2025 academic session.

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DR. (MRS.) SARAH EBUWA
Project supervisor

DEDICATION

I dedicate this work to God Almighty who was, is, and is to come, who has been my rock, shield and ever present help in times of need. The Ever loving God, omnipotent and omniscient God for his guidance throughout my years in the University of Benin and also for the wisdom and strength he gave me to finish this project.

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ABSTRACT

Glaucoma is a group of degenerative diseases of the optic nerve, and it is a major cause of irreversible blindness. Glaucoma treatment and management rely on effective prescription patterns and proper medication adherence. In Nigeria, differences in the prescription patterns and poor medication adherence remain barriers to optimal glaucoma management. This study retrospectively assessed prescription patterns and patient adherence to anti-glaucoma medications at Metroeyes Clinic, Ikoyi, Lagos, from January 2021 to December 2024, reviewing 107 patient case files. Prescription patterns were accessed by extracting data from clinical records of selected patients. The level of Adherence was assessed using the Medication Adherence Scale-12 (MAS-12) through structured phone interviews, and the data were analysed with descriptive statistics, Chi-square tests, and logistic regression using SPSS version 27.

The analysis results showed that prostaglandin analogs (59.5%) were the most commonly prescribed class of drugs, followed by fixed combination therapies (41.1%). Monotherapy was prescribed frequently than combination therapy, and most patients were given night-time (nocte) prescriptions (67.3%). Despite these rational prescription patterns, poor adherence was alarmingly high: 65.4% of patients were non-adherent, 29.9% were moderately adherent, and only were 4.7% fully adherent. The major reasons recorded for non-adherence included forgetfulness, dislike for long-term use of drugs, and perceived lack of necessity. There was no significant association found between prescription patterns and the adherence levels ($p > 0.05$), which is most likely due to the small number of adherent patients.

In Summary, whereas the prescribing patterns at Metroeyes Clinic aligned with international standards and best practices, adherence remained alarmingly low. Rational prescribing alone has been proven insufficient to improve management outcomes. Therefore, future interventions should emphasize patient education on drugs, reminder systems, patient purchasing power, and psychological support. Strengthening these areas can improve medication adherence and reduce blindness attributable to glaucoma in Nigeria and across Africa.

Keywords: Glaucoma, Prescription Patterns, Medication Adherence, MAS-12.

CHAPTER ONE

1.0 INTRODUCTION

Glaucoma is a group of optic neuropathies characterized by progressive degeneration of the optic nerve, leading to irreversible visual field loss and, in severe cases, blindness (Centre for Disease Control and Prevention, 2023). It is often referred to as the "silent thief of sight" because patients may remain asymptomatic until significant visual impairment occurs. According to global statistics, glaucoma is the second leading cause of blindness worldwide, affecting over 70 million people, with projections suggesting that this number will rise to 111.8 million by 2040 due to aging populations and increased prevalence of risk factors (Quigley et al., 2006; Tham et al., 2014).

The burden of glaucoma is particularly severe in low- and middle-income countries, where access to eye care services is limited, awareness is low, and early detection is rare. In Nigeria, studies indicate a prevalence rate of 1.5–4.5% among adults over 40 years, making glaucoma a leading cause of irreversible blindness in the country (Kyari et al., 2013; Abdull et al., 2016). Beyond visual impairment, glaucoma significantly affects quality of life, daily functioning, and socioeconomic productivity. Patients with advanced glaucoma experience difficulty reading, driving, and performing basic activities, leading to increased dependency and psychological distress (Chou et al., 2021).

Management of glaucoma centers on lowering intraocular pressure (IOP), which remains the only proven strategy to prevent optic nerve damage. Current treatment modalities include topical medications, laser therapy, and surgical interventions. Topical medications, such as prostaglandin analogs, beta-blockers, and carbonic anhydrase inhibitors, are the first-line therapy for most patients. However, adherence to these medications is a major challenge, often leading to suboptimal treatment outcomes (Stamper et al., 2009; Kass et al., 2002).

Medication adherence is influenced by multiple factors, including the complexity of the regimen, patient age, educational level, understanding of the disease, cost of medications, and fear of side effects

(Nordstrom et al., 2005; Sleath et al., 2006). Studies conducted in Nigeria have demonstrated that poor adherence, combined with irrational prescribing practices, significantly compromises treatment effectiveness and contributes to high rates of blindness (Olusanya et al., 2018; Abdull et al., 2016).

A study by Advani et al (2018) emphasized that proper patient education on the correct instillation of eye drops not only prevents infection and drug wastage but also improves compliance. Consequently, rational prescribing practices and patient-centered education are critical for effective glaucoma management.

1.1 BACKGROUND INFORMATION

Glaucoma is primarily an optic neuropathy characterized by retinal ganglion cell apoptosis, degeneration of the optic nerve head, and progressive visual field loss. Elevated IOP is a major risk factor but is not universally present, as seen in normal-tension glaucoma (NTG) (Health.com, 2024; Wilmer JHU). The World Health Organization (WHO) classifies glaucoma as a leading cause of irreversible blindness, with over 4.5 million cases worldwide, the majority occurring in developing countries (WHO, 2019).

The American Academy of Ophthalmology (AAO) describes glaucoma as a group of disorders causing structural changes in the optic nerve head, typically associated with obstruction of aqueous humor outflow, leading to increased IOP and functional visual impairment (EyeSurgeryGuide, 2024). Glaucoma is chronic, progressive, and irreversible, highlighting the importance of early detection, continuous monitoring, and appropriate treatment.

1.2 EPIDEMIOLOGY

Glaucoma prevalence varies based on age, ethnicity, geography, and glaucoma subtype. POAG is most common globally, particularly in populations of African descent. NTG is more frequent among East Asians, while primary angle-closure glaucoma (PACG) predominates in Southeast Asia (Tham et al., 2014; Quigley, 2016).

Globally, glaucoma accounts for 12–15% of blindness cases, with the prevalence expected to rise due to aging populations. In Nigeria, glaucoma is responsible for approximately 16% of irreversible blindness, emphasizing the need for enhanced screening, rational prescribing, and adherence monitoring (Akinsola et al., 2023). Risk factors include family history, advanced age, elevated IOP, myopia, corticosteroid use, and systemic vascular disorders (Kyari et al., 2013).

EPIDEMIOLOGY

Region	Prevalence (%)	Most Common Type	Reference
Nigeria	1.5–4.5	POAG	Kyari et al., 2013
Sub-Saharan Africa	4–6	POAG	Tham et al., 2014
East Asia	2–3	NTG	Wilmer JHU, 2024
Southeast Asia	1–2	PACG	Quigley, 2016

Glaucoma disproportionately affects older adults, populations of African descent, and those with systemic vascular disorders (Tham et al., 2014). Early detection is limited in developing countries due to low awareness and insufficient eye care infrastructure.

1.3 TYPES OF GLAUCOMA

1.3.1 Primary Open-Angle Glaucoma (POAG)

POAG is characterized by a structurally normal anterior chamber angle but impaired aqueous humor drainage, leading to elevated IOP and progressive optic nerve damage. POAG is asymptomatic in early stages, with peripheral vision loss often unnoticed until advanced disease (Glaucoma.org; Glaucoma Associates of Texas, 2024).

1.3.2 Normal-Tension Glaucoma (NTG)

Normal Tension Glaucoma (NTG), occurs despite normal IOP (<21 mmHg). Risk factors include systemic hypotension, vascular dysregulation, migraines, and genetic susceptibility. Patients often present with optic nerve damage similar to POAG (Health.com, 2024).

1.3.3 Primary Angle-Closure Glaucoma (PACG)

PACG arises from physical occlusion of the anterior chamber angle by the iris. Acute attacks present with **sudden ocular pain, halos, nausea, headache, and mid-dilated pupil**, while chronic cases progress silently (Wilmer JHU; Wikipedia, 2025). Prompt treatment is crucial to prevent permanent vision loss.

1.3.4 Secondary Glaucomas

Secondary glaucomas result from identifiable ocular or systemic conditions, such as:

- Exfoliative glaucoma
- Pigmentary glaucoma
- Neovascular glaucoma
- Steroid-induced glaucoma (NEI, 2024; Wikipedia, 2025)

1.3.5 Congenital and Juvenile Glaucomas

Primary congenital glaucoma arises from trabecular meshwork malformations. Symptoms include photophobia, epiphora, corneal enlargement, and corneal clouding. Juvenile open-angle glaucoma occurs in adolescence or early adulthood, often with a strong family history (AAO, 2015).

1.4 SYMPTOMS AND CLINICAL PRESENTATION

Glaucoma is often asymptomatic until late stages. However, symptom patterns vary by type:

- **POAG/NTG:** Gradual peripheral vision loss, optic nerve cupping (Health.com, 2024).
- **Acute PACG:** Eye pain, halos, blurred vision, nausea, IOP > 40 mmHg (Wilmer JHU, 2025).
- **Congenital:** Excessive tearing, photophobia, corneal clouding, eye enlargement (Glaucoma.org, 2015).
- **Secondary glaucomas:** Symptoms depend on underlying pathology, e.g., inflammation or neovascular changes (NEI, 2024).

1.5 DIAGNOSTIC TESTS

Evaluation of glaucoma involves:

- **Tonometry:** Goldmann applanation is the gold standard; non-contact and dynamic contour tonometry are alternatives.
- **Gonioscopy:** Assesses anterior chamber angle to differentiate open- vs. angle-closure glaucoma.
- **Optical Coherence Tomography (OCT):** Quantifies retinal nerve fiber layer (RNFL) thickness and optic nerve head morphology.
- **Visual field testing:** Humphrey and Octopus perimetry for functional assessment.
- **Pachymetry & corneal hysteresis:** Helps stratify risk and interpret IOP readings accurately (Mayo Clinic, 2022).

1.6 TREATMENT OF GLAUCOMA

1.6.1 Medications

First-line treatment is topical therapy to lower IOP:

- **Prostaglandin analogs:** Increase uveo-scleral outflow.
- **Beta-blockers:** Reduce aqueous humor production.
- **Carbonic anhydrase inhibitors (CAIs):** Decrease aqueous formation.
- **Alpha-agonists:** Reduce production and increase outflow.
- **Rho-kinase inhibitors:** Improve trabecular outflow (Verywell, 2024).

Side effects, cost, and dosing frequency influence adherence and treatment success.

1.6.2 Laser Therapy

- **Selective laser trabeculoplasty (SLT):** Improves trabecular outflow.
- **Laser peripheral iridotomy:** For angle-closure glaucoma.
- **Cyclophotocoagulation:** Reduces aqueous production in refractory cases.

1.6.3 Surgery

- **Trabeculectomy:** Creates new drainage pathways for aqueous humor.
- **Drainage devices/shunts:** For refractory glaucoma.
- **Minimally invasive glaucoma surgery (MIGS):** Safer, faster recovery, lower efficacy (Verywell Surgery, 2024).

1.7 MEDICATION ADHERENCE

Non-adherence to topical therapy is a major barrier to effective glaucoma management. Factors affecting adherence include age, education, disease awareness, regimen complexity, drug side effects, and cost (Patel & Spaeth, 1995; Sleath et al., 2006). Educational interventions, reminders, and simplified regimens have been shown to improve adherence (Nordstrom et al., 2005).

1.8 STATEMENT OF THE PROBLEM

In Nigeria, poor adherence to anti-glaucoma medications and irrational prescribing practices remain major challenges. Studies indicate that nearly 50% of patients with chronic diseases fail to adhere to prescribed treatment, often due to financial constraints, low health literacy, and limited access to care (Chime et al., 2020). This contributes to high rates of irreversible blindness, increased treatment costs, and poorer quality of life (Akinsola et al., 2023). Addressing these gaps is essential for improving outcomes in glaucoma care.

1.9 AIM AND OBJECTIVES

1.9.1 Aim of the study

To evaluate the prescription pattern and medication adherence in the management of glaucoma at Metroeyes Clinic, Ikoyi, Lagos State.

1.9.2 Objectives of the study

- To identify prescription patterns of anti-glaucoma medications.
- To assess medication adherence using the Medication Adherence Scale-12 (MAS-12).
- To determine factors affecting medication adherence.
- To examine associations between prescription patterns and adherence levels.

1.10 SIGNIFICANCE OF THE STUDY

- Provides evidence for refining prescription protocols for optometrists and ophthalmologists.
- Supports patient counselling and follow-up strategies.
- Enhances understanding of factors contributing to non-adherence, improving overall glaucoma management outcomes.

1.11 DEFINITION OF TERMS

A. GLAUCOMA: DEFINITION, TYPES AND CLINICNAL SIGNS

Glaucoma is not a single disease but rather a group of ocular disorders characterized by **a** progressive optic neuropathy (damage to the optic nerve head) often — though not always — associated with elevated intra-ocular pressure (IOP). For example, one review states that glaucoma is "a term describing a group of ocular disorders with multi-factorial aetiology united by a clinically characteristic intraocular pressure-associated optic neuropathy" (PubMed, Medscape). Another account emphasizes that the defining feature is damage to the optic nerve head and loss of retinal ganglion cells, with or without elevated IOP (PubMed).

In essence, glaucoma involves structural changes (such as cupping of the optic disc) and functional deficits (characteristic visual-field loss) resulting from damage to retinal ganglion cells and their axons. The optic nerve damage may occur because of pressure-mediated stress, vascular compromise, or other mechanisms (PubMed)

Thus, glaucoma may be defined as:

"An acquired optic neuropathy in which characteristic structural damage to the optic nerve and corresponding visual-field defects occur, often associated with elevated intra-ocular pressure and abnormal anterior chamber angle anatomy". This definition incorporates the key aspects: optic nerve damage, visual-field loss, variable IOP elevation, and drainage angle (anterior chamber) involvement (Lippincott Journals, nei.nih.gov, Cure Glaucoma Foundation).

Types of Glaucoma

Classification of glaucoma can be approached by *anatomical angle status*, *cause (primary vs secondary)*, and *age of onset*. (Lippincott Journals, nei.nih.gov, Cure Glaucoma Foundation).

Below is an overview of the main types:

- Primary Open-Angle Glaucoma (POAG) - This is the most common form in many populations. In POAG the anterior chamber angle (between iris and cornea) is open and appears normal on gonioscopy, yet there is increased resistance to aqueous outflow leading to gradual optic nerve damage (Medscape). Under POAG comes:

- Normal-tension glaucoma (NTG)**:** optic nerve damage and field loss despite IOP in the "normal" range. (nei.nih.gov).
- High-tension POAG: this occurs in conjunction with elevated IOP.

- Primary Angle-Closure Glaucoma (PACG): Here the angle is occluded (or becomes occluded) by the peripheral iris (or other mechanism), so aqueous outflow is blocked. This may happen acutely or chronically. The result is raised IOP, optic nerve damage and visual-field loss (nei.nih.gov).

- Secondary Glaucoma: In secondary glaucoma an identifiable ocular or systemic condition causes or contributes to elevated IOP or optic nerve damage (for example: uveitis, neovascularisation, trauma, steroid-induced) (nei.nih.gov).

- Congenital (or Childhood) Glaucoma: Glaucoma presenting in infancy or childhood, often from developmental anomalies of the anterior chamber angle or drainage structures (NCBI).

- Other Sub-types: Some further sub-types exist (pigmentary glaucoma, exfoliative/pseudoexfoliation glaucoma, neovascular glaucoma, etc.) which are often classified under secondary open-angle or angle-closure mechanisms (Medical News Today).

B. Intraocular Pressure (IOP): Intraocular pressure (IOP) refers to the fluid pressure inside the eye and represents a crucial physiological parameter for maintaining ocular structure and function (Pate, 2018). It results from the dynamic balance between the production and drainage of aqueous humour, a clear fluid that nourishes the cornea and lens while maintaining the eye's shape (Pate, 2018). This pressure is vital in sustaining the optical integrity of the globe and plays a central role in the pathophysiology of various ocular disorders, particularly glaucoma (Ophthalmology Journal, 2020).

Physiology and Regulation of IOP

The aqueous humour is secreted by the non-pigmented epithelial cells of the ciliary body and flows from the posterior chamber through the pupil into the anterior chamber (Pate, 2018). From there, it drains mainly through two routes: the trabecular meshwork and Schlemm's canal (the conventional pathway) or through the uveoscleral route (the unconventional pathway) (National Journal of Physiology, Pharmacy and Pharmacology [NJPPP], 2013). The steady-state pressure within the eye depends on the equilibrium between the rate of aqueous humour formation (F), the outflow facility (C), and the episcleral venous pressure (Pv). This relationship can be expressed as $IOP \approx F/C + Pv$ (NJPPP, 2013).

Although the vitreous body also occupies a significant intraocular volume, it is relatively static and does not contribute significantly to pressure variations (PubMed, 2018). Therefore, it is primarily the aqueous humour dynamics that regulate IOP.

Normal Range and Fluctuations

In a healthy eye, IOP usually ranges between 10 mmHg and 21 mmHg, with an average around 15.5 mmHg (Pate, 2018). However, this value is not fixed—it fluctuates throughout the day due to various physiological and environmental factors. For instance, IOP can vary depending on body posture, circadian rhythms, corneal thickness, and ocular rigidity (Pate, 2018). Diurnal variation is common, with slightly higher pressures typically observed in the morning hours (Ophthalmology Journal, 2020).

Measurement of IOP

The most common clinical method for assessing IOP is tonometry. The Goldmann applanation tonometer remains the gold standard, as it measures the force required to flatten a small, defined area of the cornea (Cleveland Clinic, 2023). Non-contact or "air-puff" tonometers are also widely used, especially for screening purposes, as they do not require corneal contact (Verywell Health, 2022). However, these measurements can be influenced by corneal thickness, curvature, and biomechanical properties (NJPPP, 2013). Hence, accurate interpretation requires clinical correlation and consideration of individual patient characteristics.

Clinical Importance and Pathophysiological Implications

IOP itself is not a disease but an essential clinical indicator. When IOP is chronically elevated—a condition known as ocular hypertension—it becomes a major risk factor for glaucomatous optic neuropathy (Ophthalmology Journal, 2020). Elevated IOP can exert mechanical stress on the optic nerve head, impairing axoplasmic flow and leading to the death of retinal ganglion cells (International Journal of Innovative Science, Engineering and Technology [IJISET], 2015). Over time, this process manifests as characteristic optic disc cupping and visual field defects associated with glaucoma.

Conversely, abnormally low IOP, termed ocular hypotony, may occur due to trauma, surgical complications, or reduced aqueous production by the ciliary body (Pate, 2018). Hypotony can result in corneal edema, choroidal effusion, or even retinal detachment if left untreated (Pate, 2018). Therefore, both elevated and reduced IOP levels have significant clinical implications that demand prompt evaluation.

Factors Influencing IOP

Various systemic and ocular factors influence IOP, including age, ethnicity, corneal thickness, blood pressure, body mass index (BMI), and even the time of day (Ophthalmology Journal, 2020). Moreover, individuals with a "normal" IOP may still develop glaucomatous damage—a condition referred to as normal-tension glaucoma (Columbia Doctors, 2023). Conversely, some individuals with slightly elevated pressures may never develop optic nerve damage. These variations highlight the importance of individualized assessment rather than relying solely on numerical thresholds (PubMed, 2018).

Therefore, intraocular pressure (IOP) is a vital measure of ocular health, reflecting the delicate balance between aqueous humour secretion and outflow. Maintaining IOP within its normal physiological range is essential to preserve the structural and functional integrity of the eye. Persistent deviation—especially elevation—poses significant risks for optic nerve damage and irreversible vision loss due to glaucoma (Pate, 2018). Understanding IOP dynamics, recognizing influencing factors, and ensuring accurate measurement are therefore fundamental to effective ophthalmic practice.

C. Medication Adherence Scale - 12 (MAS – 12): The Medication Adherence Scale-12 (MAS-12) is a self-report tool designed to assess how well patients follow their prescribed medication regimens. It measures not only the behavioural act of taking medication but also the psychological, social, and communication factors that influence medication adherence (Ueno et al., 2018). The MAS-12 was developed as a refined version of the earlier 14-item Medication Adherence Scale (MAS-14), aimed at improving clarity and reliability while reducing the respondent's burden (Ueno et al., 2018).

Background and Development

Medication adherence is a crucial determinant of treatment success in chronic illnesses such as diabetes, hypertension, and cardiovascular disease. Recognising that adherence is influenced by more than just behaviour, Ueno and colleagues (2018) sought to create an instrument that captured the multidimensional nature of adherence—covering patient-provider relationships, attitudes towards medication, and integration of medication into daily life. The initial 14-item version was simplified to 12 items after psychometric testing to eliminate redundancy and improve ease of use (Ueno et al., 2018).

Structure and Dimensions

The MAS-12 consists of 12 items, grouped into four subscales that represent different components of adherence:

1. Medication Compliance – assesses how consistently a patient follows their dosing regimen (Ueno et al., 2018).
2. Collaboration with Healthcare Providers – measures how effectively a patient communicates and cooperates with their healthcare team (Ueno et al., 2018).
3. Information Access and Utilisation – explores the patient's motivation to seek and understand medication-related information (Ueno et al., 2018).
4. Acceptance and Lifestyle Integration – evaluates how well the patient integrates medication use into daily life and accepts it as part of their health routine (Ueno et al., 2018).

Each item is scored using a Likert-type scale, and higher total scores indicate greater levels of self-reported adherence.

Psychometric Validation

Validation of the MAS-12 was conducted among 328 Japanese patients with chronic conditions. The confirmatory factor analysis supported the four-factor model with acceptable fit indices ($\chi^2/df = 2.6$, CFI = 0.94, RMSEA = 0.069), indicating a sound structural model (Ueno et al., 2018). The internal consistency of the full scale was acceptable (Cronbach's $\alpha = 0.78$), while the subscales recorded alpha values ranging from 0.45 to 0.81. Despite the relatively low reliability in the "acceptance/lifestyle integration" subscale, it was retained due to its conceptual importance in long-term adherence behaviour (Ueno et al., 2018).

Clinical Application and Interpretation

Unlike traditional adherence tools that focus solely on whether a patient takes medication, the MAS-12 provides a comprehensive understanding of the motivations and challenges behind adherence. It allows healthcare professionals to identify barriers such as poor communication with providers, insufficient medication knowledge, or low acceptance of illness (Tahara, Akiyama and Sakamoto, 2020). Clinicians can then design personalised interventions to address these factors and improve adherence outcomes.

The MAS-12 has proven particularly effective in chronic disease settings where sustained medication use is vital for disease management. By offering insights into behavioural and attitudinal dimensions of adherence, it supports more patient-centred care and shared decision-making (Tahara, Akiyama and Sakamoto, 2020).

Applications and Limitations

The MAS-12 is a practical and relatively brief tool for use in clinical and research settings. However, as a self-report measure, it may be influenced by social desirability bias **or** recall bias**,** with some patients potentially overestimating their adherence (Ueno et al., 2018). Moreover, cultural differences could affect how certain items are interpreted, suggesting that further cross-cultural adaptation and validation are warranted before applying the tool in non-Japanese populations (Tahara, Akiyama and Sakamoto, 2020).

Importance of MAS-12 in Healthcare

Adherence remains one of the biggest challenges in chronic disease management. According to the World Health Organization (2021), non-adherence significantly increases healthcare costs and worsens disease outcomes globally. The MAS-12 helps healthcare providers understand adherence as a multifaceted concept—incorporating emotional, cognitive, and relational factors—rather than a simple yes/no behaviour. This comprehensive approach allows for the development of more targeted and empathetic patient support strategies (Ueno et al., 2018).

In conclusion, the Medication Adherence Scale-12 (MAS-12) is a validated, multidimensional self-report tool that effectively captures behavioural and psychological aspects of medication adherence. Its four-factor structure offers valuable insights into patient behaviour, ranging from compliance to communication and lifestyle integration. Despite minor reliability limitations, the MAS-12 remains a reliable and practical instrument for both research and clinical practice. It serves as an essential bridge between behavioural science and medicine, helping clinicians to better understand and support patients in maintaining optimal treatment adherence (Ueno et al., 2018).

D. Prescription Pattern: The term "prescription pattern" refers to the observable habits and practices in how medications are prescribed by healthcare professionals in given settings. It encompasses not just *which* drugs are being prescribed, but *how often*, in *what combinations*, and for *which types of patients*—providing insight into both clinical decision-making and health system practices (PharmaTutor, 2024).

At its core, a prescription pattern captures the *profile of drug usage* in a particular healthcare context: the commonly used medication groups, fixed-dose combinations, generic versus brand prescribing, and adherence to treatment guidelines or essential medicine lists. For example, one review noted that prescription patterns "explain the extent and profile of commonly used groups of drugs and trends, quality of drugs and compliance with national guidelines" (World Journal of Pharmaceutical Research, 2022).

Examining prescription patterns is vital because it helps identify areas of irrational or sub-optimal prescribing. Studies have shown that many prescriptions deviate from the standards set by the World Health Organization (WHO) prescribing indicators, which in turn may lead to over-use of antibiotics, polypharmacy, increased costs, and adverse patient outcomes (Tefera et al., 2021). By auditing and analysing how providers prescribe medications, health systems gain a window into their performance, rational medicine use and potential threats such as antimicrobial resistance (Raj et al., 2018).

Prescription pattern is also shaped by a wide range of influencing factors. These include prescriber behaviour (such as habit, speciality, training), patient characteristics (age, comorbidities, socioeconomic status), health-facility constraints (medicine availability, formulary lists), and broader regulatory or cultural factors (PharmaTutor, 2024). In other words, the pattern is not purely clinical—it reflects economic, logistic and policy dimensions of care.

Analysing prescription patterns typically involves quantitative metrics: average number of drugs per encounter, percentage of encounters with an antibiotic or injection, proportion of generic medicines, and drugs from the essential medicine list (Tefera et al., 2021). For instance, one Nigerian study found an average of 2.8 ± 1.6 drugs per encounter and a generic prescribing rate of 49.6 % in two tertiary hospitals, pointing to significant deviations from rational care ideals (Adelepoju & Afe, 2023).

In practical terms, understanding prescription patterns helps healthcare managers and clinicians to target interventions. If an institution identifies high rates of fixed-dose combinations or unnecessary injections, then targeted training, formulary modification or stewardship programmes can be introduced to promote more rational prescribing behaviours. Without tracking the pattern, such inefficiencies and risks often remain hidden.

Hence, prescription pattern is a multifaceted concept that reflects what medications are prescribed, how, to whom, and under what conditions. It serves as a crucial indicator of prescribing quality and health system performance, and when examined systematically, can inform improvements in patient care, cost-effectiveness, and public health outcomes.

E. Prostaglandin Analogs (PGAs): Prostaglandin analogues (PGAs) refer to synthetic compounds that mimic the action of prostaglandin $F_2\alpha$ ($PGF_2\alpha$) and are used principally in ophthalmology to reduce elevated intraocular pressure (IOP) in conditions such as Primary open-angle glaucoma and ocular hypertension (OHT) (Review of Optometry, 2023). Their major clinical appeal lies in their substantial IOP-lowering effect, ease of once-daily dosing, and relatively favourable safety profile compared to older glaucoma medications (American Academy of Ophthalmology PPP, 2023).

From a mechanistic viewpoint, PGAs reduce IOP by increasing aqueous humour outflow—especially via the uveoscleral pathway. Specifically, these drugs bind to prostaglandin F (FP) receptors located in the ciliary muscle and sclera, leading to up-regulation of matrix metalloproteinases (MMPs), breakdown of extracellular matrix in the ciliary muscle, decreased resistance in the outflow tract, and enhanced fluid drainage (Yamamoto et al., 2022) . One systematic review noted that PGAs produced approximately a 24-33% reduction in IOP when used as monotherapy, underscoring their potency (Yamamoto et al., 2022).

Clinically, PGAs have become first-line agents in glaucoma therapy. A large meta-analysis found that PGAs outperformed not only carbonic anhydrase inhibitors and alpha-agonists but also were at least as effective as beta-blockers in lowering IOP, with differences evident as early as three months into therapy (Hodge et al., 2008). Among the commonly used agents—such as latanoprost, travoprost, tafluprost and bimatoprost—bimatoprost achieved the greatest mean IOP reduction in one network meta-analysis, although it also carried a higher risk of ocular hyperaemia (Wang et al., 2014).

Beyond efficacy, the convenience of once-daily administration—typically at bedtime—enhances patient adherence. As the dosing regimen is simpler than multiple-daily therapies, patients are more likely to adhere, which further supports the choice of PGAs in long-term glaucoma management (Glaucoma Research Foundation, 2025).

However, PGAs are not without side-effects and require thoughtful management. Ocular adverse events can include conjunctival hyperaemia, increased eyelash growth, iris and peri-ocular skin pigmentation changes, and localised periorbital fat atrophy, sometimes termed prostaglandin-associated periorbitopathy (PAP) (Turkish Journal of Ophthalmology, 2022) . Although systemic side-effects are uncommon due to minimal systemic absorption, rare cases have been reported (BMC Ophthalmology, 2024).

In practical terms, choosing a PGA involves balancing efficacy, tolerability and patient profile. For example, in a patient with lighter-coloured irises who is worried about cosmetic changes, a PGA with lower incidence of pigmentation alteration (e.g., latanoprost) may be preferred. Likewise, for a patient needing maximal IOP reduction with fewer concerns about hyperaemia, bimatoprost may be selected (PubMed, 2013).

Prostaglandin analogues represent a cornerstone of modern glaucoma therapy: they deliver robust IOP-reduction, are convenient for patients, and have acceptable safety profiles. Their mechanism of increasing aqueous outflow via the uveoscleral pathway distinguishes them from older therapies focused on aqueous production suppression. While awareness of potential ocular side-effects remains important, their benefits in preserving vision and reducing glaucoma progression make them indispensable in ophthalmic practice.

F. Carbonic Anhydrase Inhibitors (CAIs): The term carbonic anhydrase inhibitors (CAIs) describes a diverse class of agents that obstruct the activity of the enzyme Carbonic Anhydrase (CA), which catalyses the reversible hydration of carbon dioxide (CO_2) to bicarbonate (HCO_3^-) and a proton (H^+) (MA mechanism) (Supuran & Scozzafava, 2011). In simple, "human-friendly" language: carbonic anhydrases are like nature's rapid converters of CO_2 and water into bicarbonate and a proton, and CAIs throw a wrench into that converter, thereby altering a range of downstream chemical and physiological processes.

Mechanism of action and isoforms

The fundamental mechanism is that CAIs bind to the zinc-ion at the active site of CA, displacing the zinc-bound water/hydroxide and inhibiting catalysis, which in turn reduces the conversion of CO_2 into HCO_3^- and H^+ (RSC Advances, 2024). The human genome encodes multiple CA isoforms (for example CA I, CA II, CA IX, CA XII) which differ in tissue distribution, physiological role and catalytic efficiency (Supuran & Scozzafava, 2011). Because of this diversity, the development of isoform-selective CAIs (i.e., inhibitors that preferentially block one isoform over others) is an important research direction to improve therapeutic efficacy and reduce side-effects (RSC Advances, 2024).

Therapeutic uses

CAIs have found multiple therapeutic roles because they modulate processes such as fluid secretion, acid–base balance, intraocular pressure, and tumour cell micro-environment pH regulation. For example, in the eye, CAIs reduce the production of aqueous humour (fluid inside the eye) by inhibiting CA in the ciliary processes, thereby reducing intraocular pressure—this is one of the main uses in glaucoma management (RSC Advances, 2024). In addition, CAIs act as weak diuretics: by inhibiting CA in renal proximal tubules, they reduce bicarbonate reabsorption, sodium reabsorption, and thereby promote fluid loss (RSC Advances, 2024). Beyond those, they have been explored in conditions such as metabolic alkalosis, altitude sickness, certain cases of epilepsy, and as emerging agents in oncology (Critical Care, 2018).

Selectivity & research advances

Given the many isoforms of CA and their widespread presence in tissues, non-selective CA inhibition often leads to unwanted systemic effects. Research in the last decade has focused on designing inhibitors that specifically target tumour-associated isoforms (such as CA IX and XII) to exploit their role in the tumour micro-environment (Patent review 2011–2016). Studies of novel sulfonyl semicarbazide derivatives have demonstrated sub-nanomolar affinities and high selectivity for CA XII over CA I/II, illustrating how drug design is evolving (PubMed, 2014).

Safety and adverse effects

Despite their therapeutic value, CAIs are not without risks. Because the enzyme is widely distributed and the inhibitors often sulfonamide derivatives, adverse reactions can include taste changes (e.g., bitter taste), paresthesia, fatigue, gastrointestinal upset, hypokalemia, kidney stone formation, and in rare severe cases even aplastic anaemia or Stevens-Johnson syndrome (StatPearls/NCBI Bookshelf). A large population-based study found that the absolute risk of a serious complicated adverse reaction (such as Stevens-Johnson syndrome, toxic epidermal necrolysis, or aplastic anaemia) in patients using oral CAIs was 2.90 per 1000 patients vs 2.08 per 1000 in topical CAI users (Popovic et al., 2022). Thus, while the risk is low, it is non-negligible and warrants monitoring and informed consent.

Clinical considerations and limitations

Because CAIs affect bicarbonate re-absorption and acid–base balance, patients with pre-existing metabolic acidosis, hypokalemia, hyponatremia, adrenal insufficiency, or marked renal impairment require caution or avoidance (StatPearls). Also, the efficacy of CAIs in some settings (for example respiratory failure with metabolic alkalosis) has been documented to improve blood-gas parameters (e.g., decreased $PaCO_2$, increased PaO_2) but without consistent impact on major outcomes like mortality or hospital stay—evidence is limited and of low certainty (Critical Care, 2018).

Humanising the concept

If I were to explain CAIs to a friend: imagine your body has many little factories (CAs) converting CO_2 into bicarbonate so that many machines (cells) can work smoothly—making fluid, balancing acid-base, secreting stuff. A CAI is like sending in a supervisor who shuts down or slows certain factories. As a result, fewer by-products are made (less bicarbonate), fluid production slows (helping eye pressure or fluid overload), and the chemical climate shifts (acid-base changes). This can help in conditions where too much fluid or pressure is harmful, but shutting too many factories or the wrong ones can lead to side-effects nearby.

Carbonic anhydrase inhibitors represent a versatile pharmacological class that act by blocking the conversion of CO_2 and water into bicarbonate and H^+ through inhibition of CA enzymes. Their therapeutic uses span glaucoma, diuresis, metabolic, respiratory, and even oncologic applications. Advances in selective isoform targeting promise more refined therapies, although adverse effects and systemic implications demand careful patient selection and monitoring. Ultimately, CAIs illustrate how modulating a fundamental enzyme can have wide-ranging effects—both beneficial and cautionary.

G. Alpha-2 Agonists: The term "alpha- 2 agonist" refers to a class of drugs that selectively stimulate the α_2 adrenergic (adreno) receptors, which then produce distinctive physiological and therapeutic effects.

These agents have found applications across a range of clinical settings because of their ability to decrease sympathetic outflow, modulate pain and sedation, and influence cardiovascular and renal function.

Receptor biology and mechanism

Alpha-2 adrenoceptors (α_2-ARs) are G-protein-coupled receptors (GPCRs) that typically signal via inhibitory Gi/Go proteins, resulting in a reduction of cyclic adenosine monophosphate (cAMP) levels when activated (Zhou et al., 2024). These receptors are present both presynaptically (where they function as autoreceptors inhibiting norepinephrine release) and postsynaptically (in various tissues) (Eldufani et al., 2018). Three main subtypes—α_2A, α_2B, and α_2C—are described, each with somewhat distinct anatomical localization and physiological roles (Zhou et al, 2024). Activation of α_2-ARs leads to decreased sympathetic tone (by lowering norepinephrine release), which underpins many of the pharmacologic effects of alpha-2 agonists (Abd-Elsayed, 2024).

Pharmacological effects

When an alpha-2 agonist binds and activates the receptor, several downstream effects occur: reduced central sympathetic outflow (leading to lowered heart rate and blood pressure), sedation and anxiolysis (via central adrenergic inhibition), analgesic effects (by modulation of spinal and supraspinal pathways), and effects on renal handling of sodium and water (Giovannoni et al., 2009); (Abd-Elsayed, 2024). For example, in the kidney of rats the activation of α_2-ARs by agonists increased urine output and sodium excretion in certain conditions, indicating a role in renal salt and fluid regulation (Dawson & Wallace, 1989).

Clinical uses

Alpha-2 agonists are employed in a variety of therapeutic contexts:

- **Hypertension**: Drugs such as Clonidine reduce sympathetic tone and thereby lower intraocular pressure and blood pressure (Giovannitti et al. 2015).
- **Sedation and ICU care**: Agents like Dexmedetomidine and clonidine provide sedation, anxiolysis, and modest analgesia without marked respiratory depression—useful in critical care and procedural settings (Abd‑Elsayed, 2024); (Glad, 2016).
- **Analgesia / adjunct to anesthesia**: Alpha‑2 agonists enhance pain control by activating descending inhibitory pathways and reducing peripheral nociceptive input, thereby synergising with opioids and reducing their required doses (Giovannoni et al., 2009); (Zhang et al., 2023).
- **Opioid withdrawal / addiction medicine**: There is moderate‑quality evidence that alpha‑2 agonists (such as clonidine or Lofexidine) are more effective than placebo in reducing severity of opioid withdrawal symptoms (Cochrane Review, 2016).

Advantages, limitations & safety

One major advantage of alpha‑2 agonists is their multi‑modal effect: sedation + analgesia + sympathetic suppression. This makes them valuable adjuncts in multimodal therapy rather than standalone agents. However, they are not without limitations. Because α_2‑ARs are widely distributed, non‑selective activation can lead to adverse effects such as hypotension, bradycardia, dry mouth, sedation (which may be excessive), and rebound hypertension on abrupt withdrawal (Eldufani et al, 2018); (Cochrane Review, 2016). Moreover, subtype‑selective agonists are still under development so off‑target effects remain a concern (Zhou et al, 2024).

Human‑friendly analogy

Imagine your body's "fight‑or‑flight" (sympathetic) system as a busy city traffic network. When things are stressful, traffic (norepinephrine and sympathetic signals) floods the roads, speed goes up, and things get chaotic (higher heart rate, higher blood pressure, lots of signals). Alpha‑2 agonists act like traffic controllers that send signals to stop the rush of outgoing messages: they "turn down the volume" of the sympathetic output via presynaptic receptors. So the city becomes calmer: less noise, less rush, lower pressure on the system. But if you send the wrong traffic controller or too many controllers, you risk stopping traffic too much (hypotension, bradycardia, drowsiness). Also, you don't want to shut down the system entirely because parts of the city still need to function. So the art is to use the correct amount, at the right time, and preferably in the right part of the city (i.e., selecting the right subtype or location).

H. Beta-Blockers (BB): The term beta-blocker refers to a category of medications known as β-adrenergic receptor antagonists, which work by blocking the effects of endogenous catecholamines such as epinephrine and norepinephrine at β-adrenoceptor sites (Ripley & Saseen, 2014). These agents act by competitively inhibiting β-adrenergic receptors, thereby reducing sympathetic nervous system activation of the heart, kidneys and vasculature (Bilska, 2024). For instance, when β_1-receptors (predominantly found in the heart and kidneys) are stimulated, the heart rate increases, contractility rises and renin release is stimulated – beta-blockers blunt these responses, resulting in slower heart rate, less forceful contractions and reduced renin–angiotensin activation, thus lowering blood pressure and cardiac workload (Sen et al., 2022). In contrast, β_2-receptors (located in the lungs, vascular smooth muscle, liver and other tissues) mediate bronchodilation and glycogenolysis; non-selective beta-blockers that block β_2-receptors can therefore cause bronchoconstriction and affect metabolic responses (Medical News Today, 2025).

Beta-blockers can be classified by selectivity and additional properties. Some are cardio-selective, primarily blocking β_1-receptors, such as metoprolol or bisoprolol, which produce less β_2 blockade and are often preferred in patients with respiratory disease (Bilska, 2024). Others are non-selective (e.g., propranolol) and block both β_1 and β_2 receptors; still others (third-generation) also have vasodilatory properties or intrinsic sympathomimetic activity (Ripley & Saseen, 2014; Bilska, 2024). Clinically, beta-blockers are used widely for cardiovascular conditions: hypertension, angina pectoris, various arrhythmias, post-myocardial infarction care and heart failure management (Sen et al., 2022; Medical News Today, 2025). Beyond the heart, their use has extended to migraine prophylaxis, essential tremor, anxiety (especially physical symptoms), glaucoma (topical forms) and portal hypertension (Medical News Today, 2025).

The therapeutic rationale behind beta-blockers lies in reducing the heart's workload and oxygen demand, limiting sympathetic over-drive, and ameliorating the harmful effects of chronic adrenergic activation (Sen et al., 2022). In hypertension, these drugs lower cardiac output and inhibit renin release—thus decreasing angiotensin II formation, aldosterone secretion, blood volume and peripheral resistance (Sen et al., 2022). Yet, with all their benefits, beta-blockers come with potential side-effects and require careful use. Common adverse effects include bradycardia (slow heart rate), hypotension (low blood pressure), fatigue, dizziness, cold extremities (particularly from β_2 blockade) and sometimes sleep disturbances or erectile dysfunction (NCBI Bookshelf, 2025; Medical News Today, 2025). Particular caution is needed in patients with asthma, chronic obstructive pulmonary disease (COPD) or Raynaud's phenomenon, because non-selective agents may provoke bronchospasm or worsen peripheral vasospasm (OpenStax, 2025; NCBI Bookshelf, 2025).

Nevertheless, the benefits in appropriate clinical settings are compelling: by slowing the heart rate, reducing myocardial oxygen consumption and blunting harmful remodelling in heart failure, beta-blockers may improve outcomes and survival in properly selected patients (Sen et al., 2022). From a human-centred perspective, one might imagine the heart as being constantly under pressure from the body's "fight or flight" accelerator; a beta-blocker gently eases off the accelerator, giving the heart a chance to rest, recover and function more sustainably—though the trade-off can be feeling a little slower or cooler in one's hands and feet.

I. Fixed Combination Therapies: The term fixed combination therapy (often framed as a "fixed-dose combination" or FDC) refers to a pharmaceutical formulation in which two or more active pharmaceutical ingredients (APIs) are combined in a single dosage form with fixed ratios and administered together as one product (Onwuzuligbo & Onwuzuligbo, 2024). The underlying rationale is that when multiple drugs target the same condition or related pathophysiological pathways, combining them in one pill may simplify treatment, improve patient convenience, optimise pharmacological synergy and potentially enhance therapeutic outcomes (European Medicines Agency [EMA], 2017).

In clinical terms, fixed combination therapy is most often applied when treatment of a condition genuinely calls for more than one mechanism of action: for example, in hypertension it is well recognised that monotherapy often fails to achieve target blood pressure in a substantial proportion of patients, and hence fixed-dose combinations of two antihypertensive classes have been proposed as first-line treatment (Moser & Black, 1998). Indeed, fixed combinations have been shown to improve adherence and persistence in various settings—owing largely to the reduced pill burden and simpler regimen (Torp-Pedersen et al., as cited in systematic review, 2018; also see Onwuzuligbo & Onwuzuligbo, 2024). For instance, in glaucoma therapy a real-world study found that patients on fixed-combination drops had higher adherence and persistence than those on unfixed combinations, likely because of reduced complexity of administration (Nishimura et al., 2021).

However, fixed combination therapy is not without caution: combining fixed doses means less flexibility to adjust individual component doses for particular patients, the ratio of components may not be ideal for every patient, and interactions (pharmacokinetic or pharmacodynamic) between components may produce unforeseen adverse effects (Franklin & Francis, as summarised in general review, 2004). Onwuzuligbo & Onwuzuligbo (2024) note these disadvantages in the context of chronic disease management, highlighting that while FDCs carry advantages they also "inherit the rigidities" of fixed formulation models.

The regulatory guidance from the EMA emphasises that fixed combinations should be built on valid therapeutic principles: each component must contribute to the overall effect, and the fixed-dose formulation must offer clear benefits (for example improved efficacy, safety, adherence or cost) compared with free combination or monotherapy (EMA, 2017). In other words, the mere fact that two drugs can be taken together does not justify their combination in a fixed pill form unless the benefit-risk balance is favourable compared with separate dosing.

From a human-centred perspective, we might visualise fixed combination therapy as turning "several keys at once with one hand" rather than juggling separate keys, thereby streamlining treatment for patients who might otherwise struggle with multiple pills, timings and instructions. It is akin to combining ingredients in a single meal rather than making separate dishes—more convenient, potentially more satisfying, but only if the mix works well for the diner. Patients thus may feel the difference: fewer pills to swallow, fewer prescription changes, less confusion—but they also may surrender some tailoring of doses to individually adjust components.

J. Mono-therapy: The term monotherapy refers to the treatment of a disease or condition using a single therapeutic agent rather than multiple drugs in combination (Onwuzuligbo & Onwuzuligbo, 2024). In pharmacology and clinical practice, monotherapy is often considered the first-line strategy when a single agent is sufficient to achieve the desired therapeutic effect, allowing clinicians to simplify treatment, minimize drug interactions, and reduce the risk of adverse effects (Patel & Kumar, 2021).

Monotherapy is commonly applied across a wide range of conditions. For instance, in hypertension, initial treatment may involve a single antihypertensive drug, such as an ACE inhibitor, calcium channel blocker, or thiazide diuretic, with subsequent escalation to combination therapy only if target blood pressure is not achieved (Moser & Black, 1998). Similarly, in diabetes management, metformin monotherapy is recommended as the first-line intervention for most patients with type 2 diabetes due to its efficacy, safety profile, and cost-effectiveness (American Diabetes Association, 2024).

One of the key advantages of monotherapy is the clarity it provides in monitoring drug efficacy and adverse effects. Because only a single agent is used, clinicians can more easily attribute therapeutic outcomes or side effects directly to that drug, facilitating dose adjustments and patient counselling (Onwuzuligbo & Onwuzuligbo, 2024). Additionally, monotherapy can improve adherence due to the simplicity of the regimen, particularly in populations with multiple comorbidities or in elderly patients where polypharmacy is a concern (Patel & Kumar, 2021).

However, monotherapy may not always achieve optimal disease control. Many chronic conditions, such as hypertension, type 2 diabetes, and certain psychiatric disorders, involve multifactorial pathophysiology; in these cases, monotherapy may be insufficient, necessitating either sequential therapy or combination therapy to reach therapeutic goals (Bahiru et al., 2017). Furthermore, relying on a single agent may increase the risk of resistance, as seen in antimicrobial and oncologic treatments, where combination strategies are often used to prevent drug resistance (Nightingale et al., 2020).

From a patient-centered perspective, monotherapy represents simplicity and focus. It is akin to using a single, well-targeted tool to solve a problem rather than juggling multiple instruments; it minimizes complexity, reduces confusion, and often leads to better tolerability. Yet, the limitation lies in its "one-size-fits-all" nature: while ideal for some, it may be inadequate for others whose disease requires more nuanced, multi-pronged intervention.

CHAPTER TWO

2.0 LITERATURE REVIEW

Recent studies have begun to highlight localized prescription trends in glaucoma management within urban Nigerian settings.

Ogunleye et al (2021) observed that prostaglandin analogues, notably latanoprost, were the most frequently prescribed class of medications in eye clinics across urban Lagos. This aligns with global best practices which endorse prostaglandin analogues as first-line therapy due to their potent intraocular pressure-lowering effects, minimal systemic side effects, and once-daily dosing convenience. He also noted that the preference for these medications was influenced by both physician's awareness of international treatment guidelines and the socioeconomic class of the patient population, which was more likely to afford such medications. This finding underscores the role of urbanization and economic status in shaping prescription behaviour and reflects disparities that may not be present in rural or less-resourced areas of Nigeria. As such, understanding local prescribing patterns can provide valuable insights for health policy reforms aimed at standardizing glaucoma treatment across diverse healthcare settings in the country.

Akinsola et al (2023) assessed compliance levels among glaucoma patients in a Nigerian tertiary hospital. Findings revealed that only 21.1% of patients exhibited good compliance, with factors influencing poor adherence including increasing age, high medication costs, prolonged treatment duration, and a lack of understanding regarding the medication's effects. Their study underlines the poor compliance of patients in the Tertiary hospital where the study took place. The factors which they highlighted underscores that the issue of poor compliance to medications cuts across all levels of medical care and not just merely what can be obtainable in rural settings. Thus, understanding prescribing patterns and likely factors can provide insights useful for reforms and for better patient management outcomes in that hospital.

Sleath et al (2006) examined medication adherence among 581 patients with glaucoma and found that only 60% followed their prescribed eye-drop regimen correctly. The study highlighted forgetfulness, being preoccupied with daily tasks, and general negligence as the primary reasons for non-adherence.

These findings indicate that adherence is influenced by behavioural and lifestyle factors in addition to clinical considerations. Forgetfulness, for example, may arise from the lack of structured routines or reminder systems, while being busy reflects competing priorities that can interfere with consistent medication use. Negligence may stem from limited understanding of glaucoma's asymptomatic progression or underestimation of the risks associated with missed doses. Sleath and colleagues emphasized the potential benefits of interventions such as patient education, reminders, or family support to improve adherence. Their work underscores the importance of addressing both behavioural and informational barriers to optimize glaucoma management.

Nordstrom et al (2005) analysed long-term adherence patterns using insurance claims data over a three-year period. The study revealed a progressive decline in adherence over time, with rates in the third year ranging from 15% to 58% depending on the type of glaucoma medication. Prostaglandin analogues (PGAs) demonstrated the highest adherence, followed by β-blockers, while α-antagonists and carbonic anhydrase inhibitors (CAIs) showed lower and comparable adherence rates. This longitudinal study highlights the challenge of sustaining long-term compliance, particularly for chronic diseases requiring daily treatment. Differences in adherence by drug class may be influenced by factors such as dosing frequency, side effect profiles, and ease of administration. The findings suggest that clinicians should consider these factors when prescribing glaucoma medications and that the strategies to maintain adherence over time are critical for effective disease control.

In Nigeria, Oluwatosin et al (2019) investigated adherence among patients at the Ekiti State University Teaching Hospital and found that 27.5% of participants did not follow their prescribed regimen. Key barriers included financial constraints, forgetfulness, difficulty with eye-drop administration, and adverse effects of medications. Financial difficulties were a significant contributor, reflecting broader socioeconomic challenges that may limit access to regular treatment. Practical difficulties, such as problems with instilling eye drops, further reduced adherence, particularly among older patients or those with physical limitations. The study demonstrates that improving adherence requires a comprehensive approach, incorporating patient education, practical training on medication use, and financial support mechanisms.

Eze et al (2018) conducted a study on newly diagnosed glaucoma patients in Enugu State, Nigeria, revealing that only 17.6% attended follow-up appointments, and among them, just 25% adhered to treatment. The primary reasons for non-compliance included limited financial resources, long travel distances to healthcare facilities, and insufficient knowledge about glaucoma. These findings emphasize the role of systemic and informational barriers in adherence. Geographic accessibility and patient education are critical factors that influence whether patients maintain regular treatment. The study underscores the importance of community-based interventions, improved healthcare accessibility, and continuous patient counselling to address these challenges and enhance treatment outcomes.

Akinsola et al (2023) similarly highlighted factors affecting adherence in Nigeria, noting that high medication costs, forgetfulness, and lack of understanding of glaucoma significantly impacted compliance. Their research emphasizes the interplay between socioeconomic status and health literacy in adherence. Patients often fail to recognize the importance of on-going treatment due to the asymptomatic nature of early-stage glaucoma, which may lead to underestimation of disease severity. Addressing these issues requires health education initiatives, financial assistance, and practical support to help patients adhere to their prescribed regimens.

Aina et al (2018) studied compliance at Bowen University Teaching Hospital in Ogbomosho, finding that only 21.1% of patients demonstrated satisfactory adherence. Older age, high cost of medications, long disease duration, and limited appreciation of medication efficacy were identified as key barriers. The study illustrates the cumulative effects of age, economic challenges, and disease chronicity on adherence. Older patients may struggle with complex dosing regimens, while extended treatment duration can reduce motivation. These findings highlight the necessity of patient-centered interventions, such as counselling tailored to age and socioeconomic status, as well as education on the benefits of consistent therapy.

Adebayo and Salami (2020) reported that approximately 60% of glaucoma patients in south-western Nigeria exhibited poor adherence, citing low health literacy, financial difficulties, and forgetfulness as major contributors. They also noted that the asymptomatic nature of early glaucoma stages often results in non-compliance. This is because patients may not perceive immediate consequences of missed doses. The findings from their study align with other findings across sub-Saharan Africa, where socio-economic and educational factors significantly influence adherence. Effective interventions may include patient education campaigns, structured follow-ups, and financial support strategies to improve compliance and reduce the risk of vision loss.

Ayanniyi et al (2018) examined how glaucoma medications were prescribed across primary and tertiary healthcare facilities in Nigeria, revealing significant differences in treatment approaches. These inconsistencies were linked to poorer clinical outcomes, such as delayed diagnosis and less effective disease management. The study emphasized that the absence of standardized treatment protocols contributes to variability in care and may undermine patient trust. The authors recommended establishing uniform, evidence-based guidelines for glaucoma management across all healthcare levels and providing targeted training for healthcare providers. Implementing these measures could reduce disparities in care and improve visual outcomes for patients.

Glaucoma encompasses a group of eye diseases characterized by progressive optic nerve damage, often associated with elevated intraocular pressure (IOP). Early stages are typically asymptomatic, which has led to the disease being termed “the silent thief of sight” (Weinreb *et al.,* 2014). Many individuals are unaware they have glaucoma until substantial, irreversible vision loss occurs, underscoring the importance of early detection and regular monitoring.

Globally, glaucoma is one of the leading causes of irreversible blindness, affecting approximately 11 million people with bilateral visual impairment. This figure is projected to increase to more than 111 million by 2040, largely due to aging populations and restricted access to eye care in low- and middle-income regions (Tham *et al.,* 2014). Sub-Saharan Africa bears a disproportionate share of the burden, with glaucoma ranking as the second leading cause of blindness after cataracts. In Nigeria, prevalence among adults aged 40 and above is estimated at 5.02% (Kyari *et al.,* 2013). Contributing factors include late presentation, limited screening programs, and insufficient public awareness, all of which delay treatment initiation and increase the risk of irreversible vision loss.

In sub-Saharan Africa, the burden is disproportionally high, with glaucoma being the second leading cause of blindness after cataract. Nigeria, in particular, shows a prevalence rate of approximately 5.02% among adults aged 40 years and above. Contributing factors include late diagnosis, lack of regular screening programs, and insufficient public health education (Kyari *et al*., 2013).

Prescription patterns in glaucoma management are shaped by clinical guidelines, physician preferences, availability of medications, and patient-specific factors. According to the recommendation from the European Glaucoma Society (2020), prostaglandin analogues are the preferred first-line therapy due to their efficacy in reducing IOP and their once-daily dosing. Other classes of medications include beta-blockers, alpha agonists, and carbonic anhydrase inhibitors. When mono-therapy fails or becomes inadequate, combination therapies are then introduced.

In resource-limited settings, such as Nigeria, actual prescribing patterns often diverge from these recommendations because of high costs and limited drug availability (Eze *et al*., 2018). Fixed-combination medications, which could simplify regimens and improve adherence, are underused due to expense and scarcity in public health facilities (Olusanya *et al.,* 2018). Additionally, patients with advanced glaucoma frequently receive multiple medications (polypharmacy), increasing regimen complexity and potentially reducing adherence. These challenges highlight the importance of tailoring prescription strategies to local contexts, balancing efficacy with affordability and availability.

Medication adherence refers to the degree to which patients follow their prescribed treatment plans. In glaucoma, maintaining a consistent regimen is critical for controlling IOP and preserving optic nerve integrity. Despite its importance, adherence rates are frequently low, ranging globally from 50% to 70% and often lower in developing countries (Muir *et al*., 2020). Several factors influence adherence, including socioeconomic status, education, side effects, and the complexity of the treatment regimen (Kim *et al.,* 2017). In Nigeria, financial limitations, forgetfulness, and limited health literacy are common barriers (Oluwatosin *et al.,* 2019; Akinsola *et al.,* 2023). The lack of noticeable symptoms in early disease further discourages consistent medication use.

Non-adherence, coupled with inconsistent prescribing, accelerates glaucoma progression and increases the risk of blindness (Tsai, 2006). Frequent changes in medication without sufficient monitoring can confuse patients and reduce trust in therapy, while incomplete documentation and non-standardized protocols exacerbate the problem (Eze *et al*., 2018). Chronic conditions, particularly those without early symptoms, often face similar adherence challenges. Evidence shows that patients with chronic illnesses take only 30–70% of their prescribed doses, and up to half stop medications within the first months. Ophthalmic studies indicate that glaucoma follows a similar pattern, with poor adherence linked to worse outcomes, higher complication rates, and greater healthcare costs.

As with the characteristics of chronic diseases, which may also be asymptomatic, many patients with glaucoma have difficulties in maintaining good compliance levels to prescribed medications. On average, patients with chronic medical conditions were found to take 30-70% of the prescribed medication doses, and on an average 50% discontinue medications in the first months of therapy. The ophthalmic literature shows similarly low rates of adherence to treatment. Indeed, poor adherence is associated with disease progression and increased complication rates, as well as healthcare costs.

The present review analyzes and discusses the causes of variability of the adherence to the prescribed drugs. The education of patients about glaucoma and the potential consequences of insufficient adherence and persistence seem fundamental to maximize the probability of treatment success and therefore prevent visual disability to avoid unnecessary healthcare costs (Luciano Quaranta *et al.,* 2023).

The variability in adherence and prescribing practices has serious implications for patients and healthcare systems. Educating patients about glaucoma and the consequences of poor adherence is essential to improving treatment persistence and preventing vision loss (Luciano Quaranta *et al.,* 2023). Structured follow-ups and supportive interventions can enhance compliance, increasing the likelihood of successful treatment. Poor adherence also places additional strain on healthcare systems by necessitating more invasive and expensive procedures when disease progresses. Retrospective studies provide valuable insight into real-world clinical practices, treatment outcomes, and patient behaviours, particularly in resource-constrained settings. By highlighting trends in prescribing and adherence, such studies inform interventions to optimize care delivery and improve patient outcomes (Abdull *et al*., 2016).

In facilities like Metroeyes Clinic, retrospective reviews can uncover service gaps, improve care delivery, and support evidence-based policy changes aimed at reducing glaucoma-related blindness.

CHAPTER THREE

3.0 MATERIALS AND METHOD

3.1 RESEARCH DESIGN

This study was conducted utilizing a Retrospective cross-sectional study design for all complete glaucoma case files from January 2021–December 2024, to access the prescription pattern and factors for non-compliance such as forgetfulness, whether the drugs are necessary or working, cost of drugs, etc. medications among patients being managed for Glaucoma at Metroeyes clinic Ikoyi, Lagos State.

3.2 STUDY LOCATION

This study was carried out in Metroeyes Clinic Ikoyi, Lagos State Nigeria.

3.3 STUDY POPULATION

Study population consists of patients diagnosed with Glaucoma and are aged 18–80 years attending Metroeyes Clinic. The total population size is the number of Patient files within the selected time frame under study.

3.4.1 SAMPLING TECHNIQUE

A Purposive sampling of all complete glaucoma case files seen from January 2021–December 2024 made up the study population.

3.4.2 SAMPLE SIZE DETERMINATION

All patient records based on availability and completeness within the target time frame (January 2021–December 2024). Hence from the clinic records, a total of 107 patients were selected for this study.

3.5 STUDY DURATION

This study was carried out within a period of three (3) months.

3.6 RESEARCH MATERIALS

1. Case file abstraction form

2. Glaucoma Medication Adherence Questionnaire (Medication Adherence Scale-12, MMAS-12)

3.6.1 INCLUSION CRITERIA

- Outpatients Diagnosed with glaucoma

- Patients aged 18-80yrs and diagnosed of glaucoma ≥ 1 year up

- Complete medical record (≥1 year of follow-up)

3.6.2 EXCLUSION CRITERIA

- Patients with serious or unstable medical conditions

- Newly diagnosed patients < 1yr

- Incomplete prescription history

- Cognitive impairment affecting self-report

3.7 PROCEDURE

The procedure for the study was duly explained to the management of Metroeyes and consent was given to access the patients' clinical files seen within January 2021 to December 2024, and was informed about the procedures for this study to be carried out. Two forms of questionnaires were administered in this study. **Form 1** (Case file abstraction file) consist of 3 sections; A, B, C. Section A consists of participant's bio-data, family oculo-visual history, Diagnosis, type of glaucoma diagnosed, severity of the disease (Hodapp-Parrish-Anderson criteria: mild (mean deviation ≥−6 dB); moderate (mean deviation −12dB) or severe (mean deviation ≤−12dB)), date of diagnosis. Section B contains the section for medications to manage the diagnosis of Glaucoma, conc. of drugs, class of drugs, frequency, and route of administration. Section C contains space for summary and observations/recommendations from attending Doctor. While **Form 2** is the Medication Adherence Scale-12 (MAS-12), which was administered to the participants to check their adherence and compliance to the prescribed medications. The questionnaire was administered to each Participant via a phone call. Each of these participants must have been diagnosed of Glaucoma or being managed for glaucoma within the time frame under review. Only those who were diagnosed of glaucoma or currently being treated for Glaucoma within the time under review were selected for the study.

The age of each subject was recorded and they ranged between 18- 80.

Also the Glaucoma was classified according to the types, as either Primary open angle Glaucoma (POAG) or as Angle closure Glaucoma (ACG).

3.8 DATA ANALYSIS

Descriptive statistics was performed for the basic features of the data obtained from the study to include the mean with standard deviation for continuous variables and frequency (n) and percentage(%) for the categorical variables. the MAS-12 score distribution.

Inferential Statistics including Chi-square test for associations, Logistic regression was used to analyze predictors of adherence and factors for non-compliance to medications with Significance set at $p < 0.05$. Primarily, the overall impact of the independent variables was examined by entering all independent variables into the regression model and, secondarily, backward elimination analysis was performed by adjusting gender and age as fixed variables. To evaluate the appropriateness of the back ward elimination analysis model, Hosmer-Lemeshow's goodness-of-fit test was performed and the model was deemed to be appropriate at a significance level with $p>0.05$.

Statistical Analyses were performed using the Statistical Package for Social Science (SPSS) computer software version 27.0 to tabulate the various variables for meaningful interpretation and all p values obtained from statistical analyses were the results of two-sided tests, in which the significance was set at $p<0.05$.

3.9 ETHICAL CONSIDERATION

- Ethical clearance was obtained from the department research and Ethnic committee the department of optometry, University of Benin, Benin city in accordance with the tenets of the Declaration of Helsinki.
- Informed consent from the clinic on behalf of the participants was obtained before questionnaires were administered.
- The study prioritizes the right and anonymity of research participants. The researcher committed to minimizing any potential risk associated with data collection and emphasized that the finding must be used solely for academics purpose.
- Integrity and confidentiality was maintained when handling sensitive health information which is an approach to ethical consideration to uphold all dignity and privacy of all individuals involved in the study.

3.10 LIMITATIONS TO STUDY

1. Unreliability of patient’s self-reports during administration of the MAS-12 questionnaire (recall bias)

2. There was bias in age distribution as the participants were majorly older adults (>40yrs old).

3. Case files having incomplete information were removed from the study thereby leading to lower a sample size.

4. Sample size was relatively small (n=107).

5. Exclusion of incomplete records may have introduced selection bias.

CHAPTER FOUR

4.0 RESULT AND DATA ANALYSIS

This chapter presents the results of Frequency distribution of the patients' bio-data including their gender, age, family history, date of diagnosis, glaucoma type and prescription pattern. Also included are the results of the Descriptive and inferential analyses conducted to examine the association between prescription patterns (drug type, drug class, and frequency of administration) and medication adherence.

4.1 Socio-demographic characteristics of the respondents

A total of one hundred and seven patients' records were used for this study, out of which fifty-eight (54.2%) were males while forty-nine (45.8%) were females. 25 of the patients are aged between 51-60 years, 23 were aged between 41-50 years and 61-70 years, 21 were aged between 71-80 years, 8 were aged between 31-40 years, 5 were aged between 21-30 years while just 2 are aged between 18-20 years. The minimum age is 18 years and maximum age is 80 years. Out of these 107 patients, 90 (84.1%) had negative family history of glaucoma whereas 17 (15.9%) had positive history of glaucoma.

Table 1: Socio-Demographics of the Patients

Variable	Category	Frequency	Percentages
Gender	Male	58	54.2
	Female	49	45.8
Age	18 - 20years	2	1.9
	21 - 30years	5	4.7
	31 - 40years	8	7.5
	41 - 50years	23	21.5
	51 - 60years	25	23.4
	61 - 70years	23	21.5
	71 – 80years	21	19.5
Family History	Positive	17	15.9
	Negative	90	84.1

Fig. 1: Bar chart showing distribution of the Age-groups of Patients

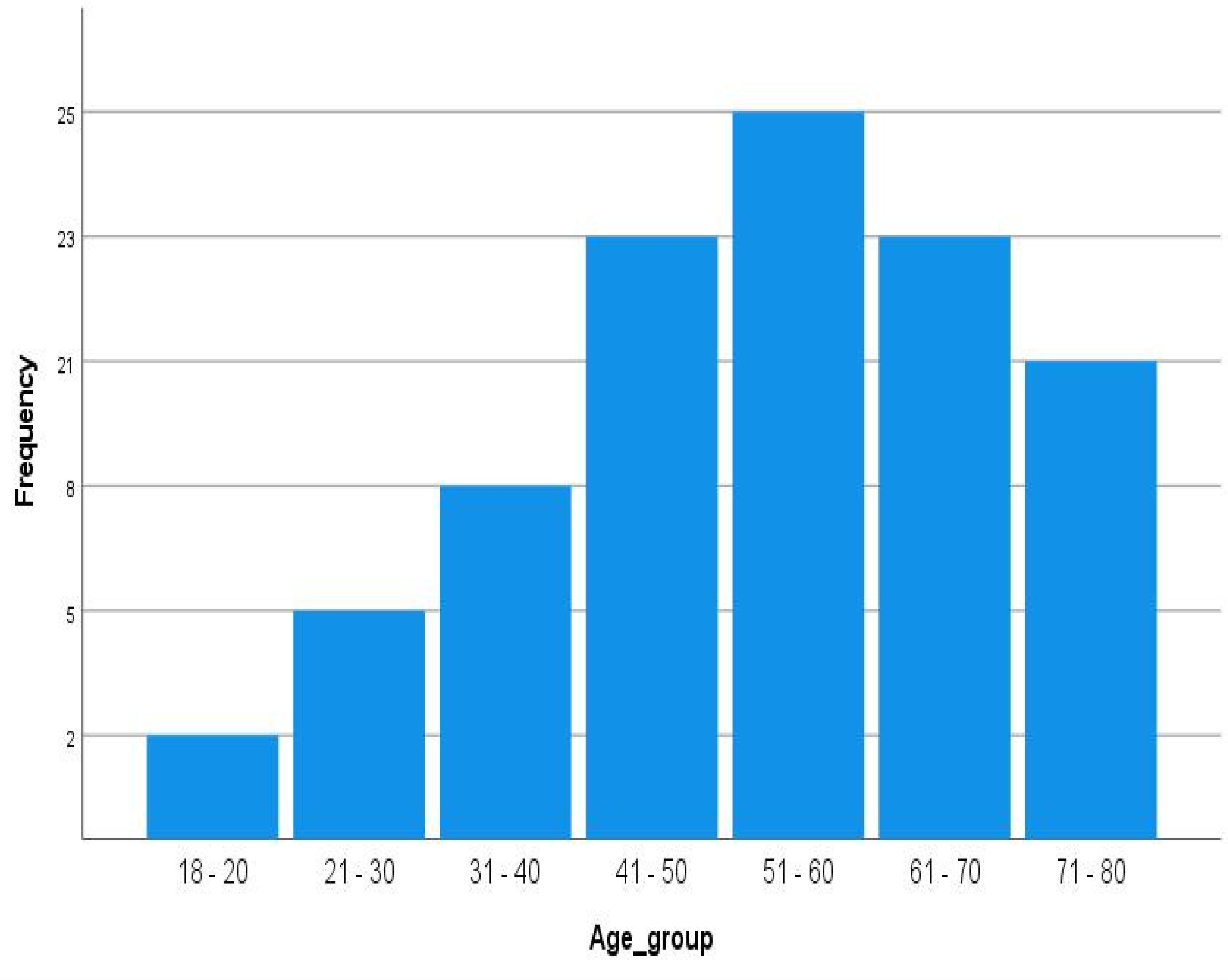
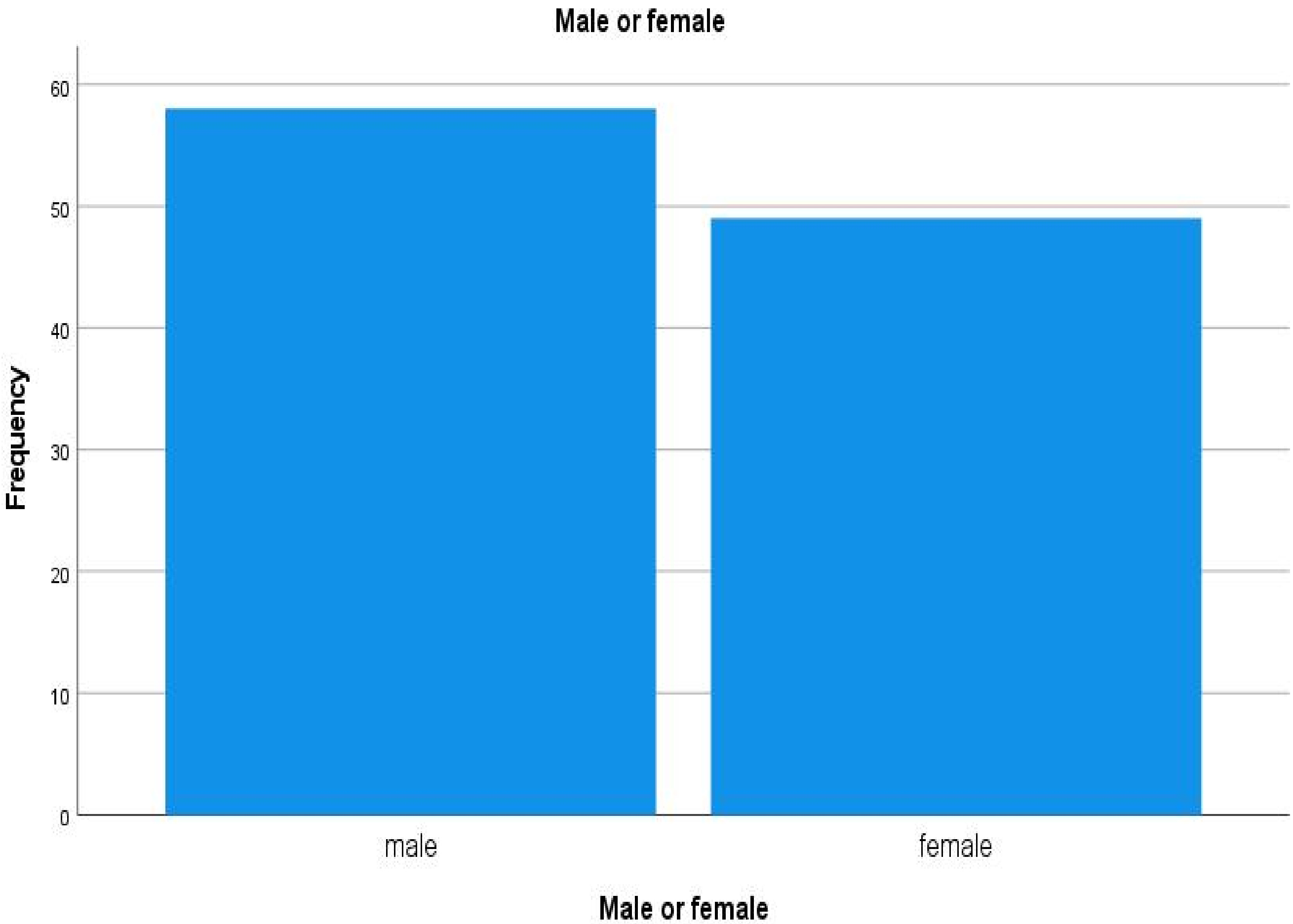
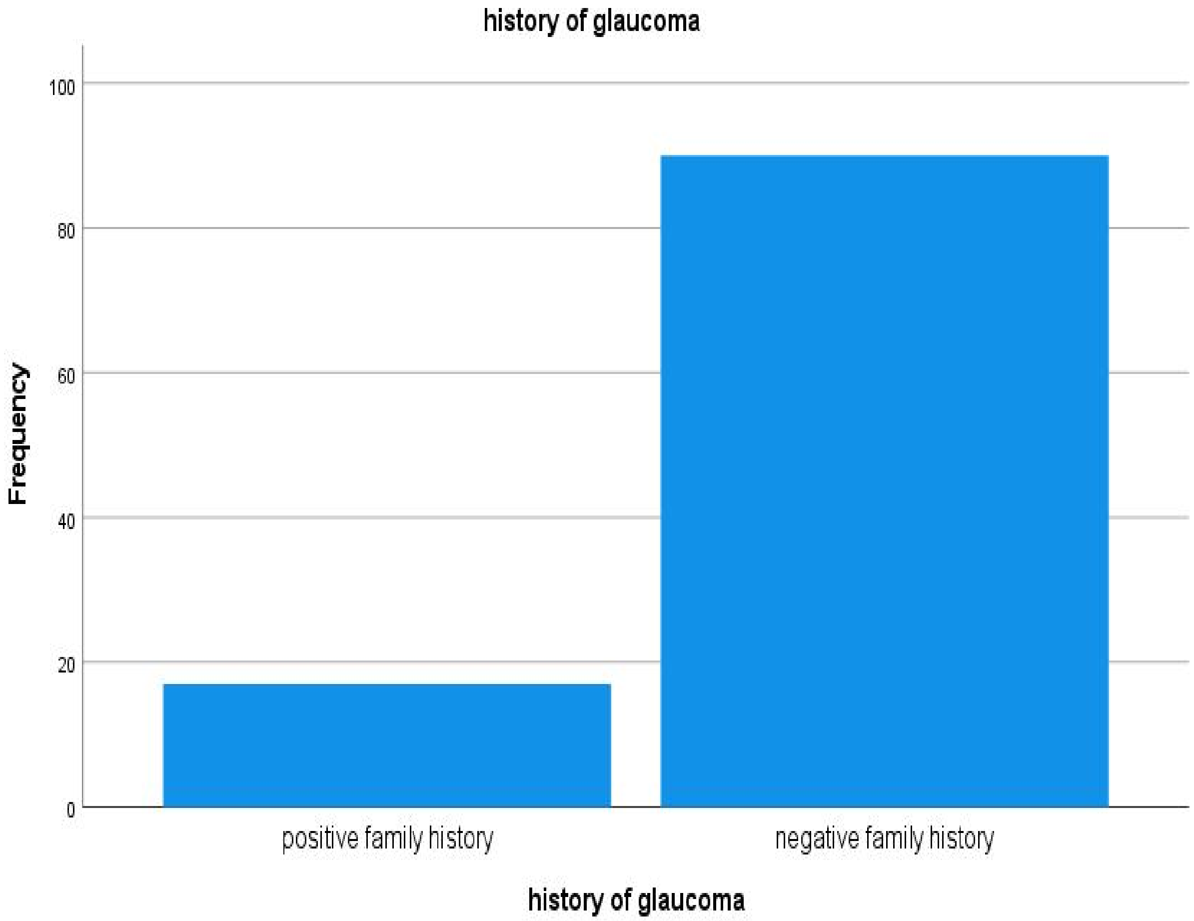


Fig 2: Bar chart of Showing Gender Distribution of Patients



Male – 58 (54.2 %), Female – 49 (45.8 %)

Fig. 3: Bar chart showing the distribution of Family history of glaucoma among patients



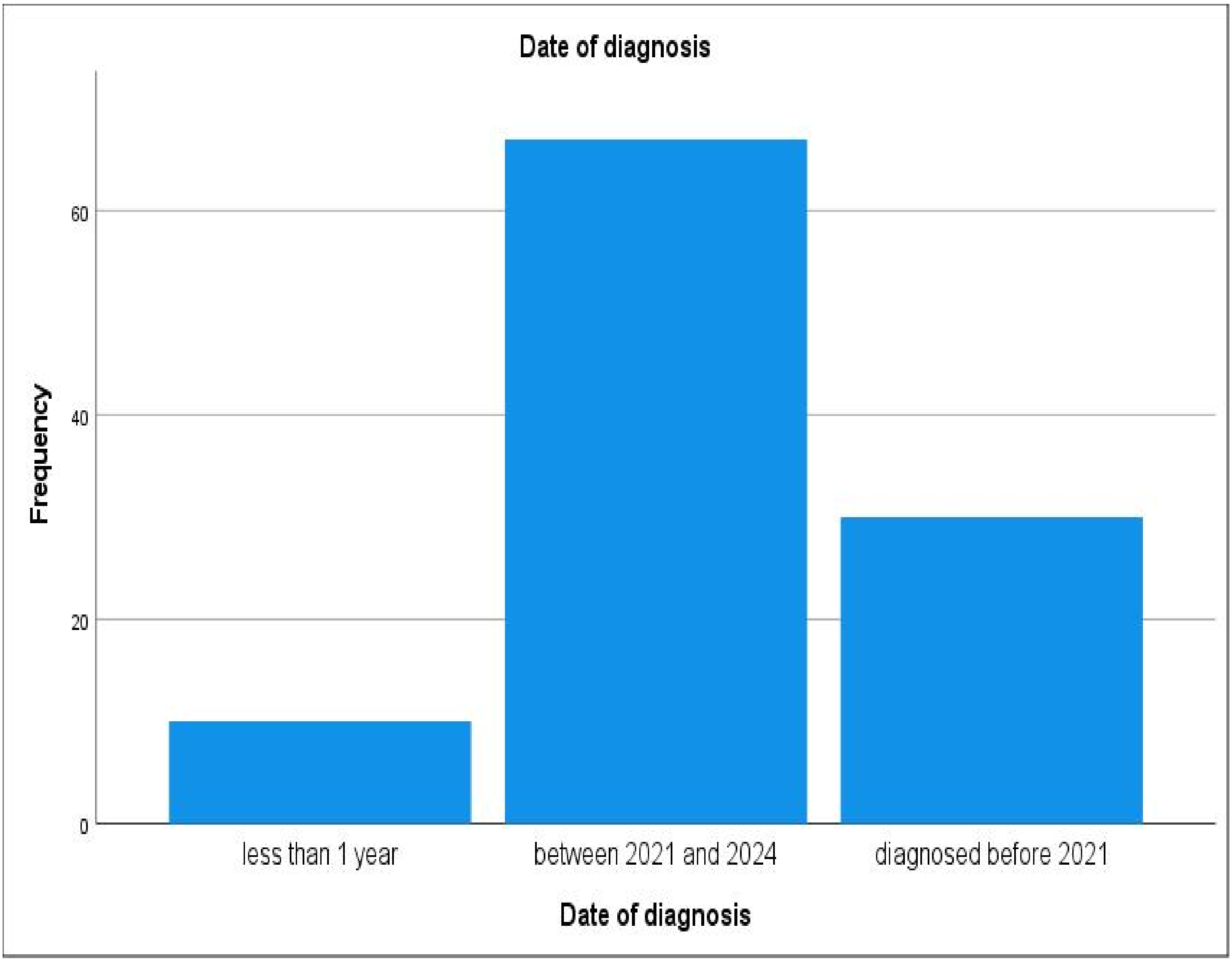
The table above showed that 84.1% (90) of the patients had negative family history of glaucoma, while 15.9% (17) of the patients had positive family history of glaucoma.

Table 2: Distribution of date of diagnosis

	FREQUENCY (n)	PERCENTAGE (%)
Less than a year	10	9.3
Between 2021 and 2024	67	62.6
Diagnosed before 2021	30	28.0
Total	107	100

The table above showed that 9.3% (10) of the patients were diagnosed of glaucoma less than a year, 62.6% (67) of the patients diagnosed of glaucoma between 2021 and 2024, while 28.0% (30) were diagnosed of glaucoma before 2021.

Fig. 4: Bar chart showing Date of Diagnosis



The table above showed that 9.3% (10) of the patients were diagnosed of glaucoma less than a year, 62.6% (67) of the patients diagnosed of glaucoma between 2021 and 2024, while 28.0% (30) were diagnosed of glaucoma before 2021.

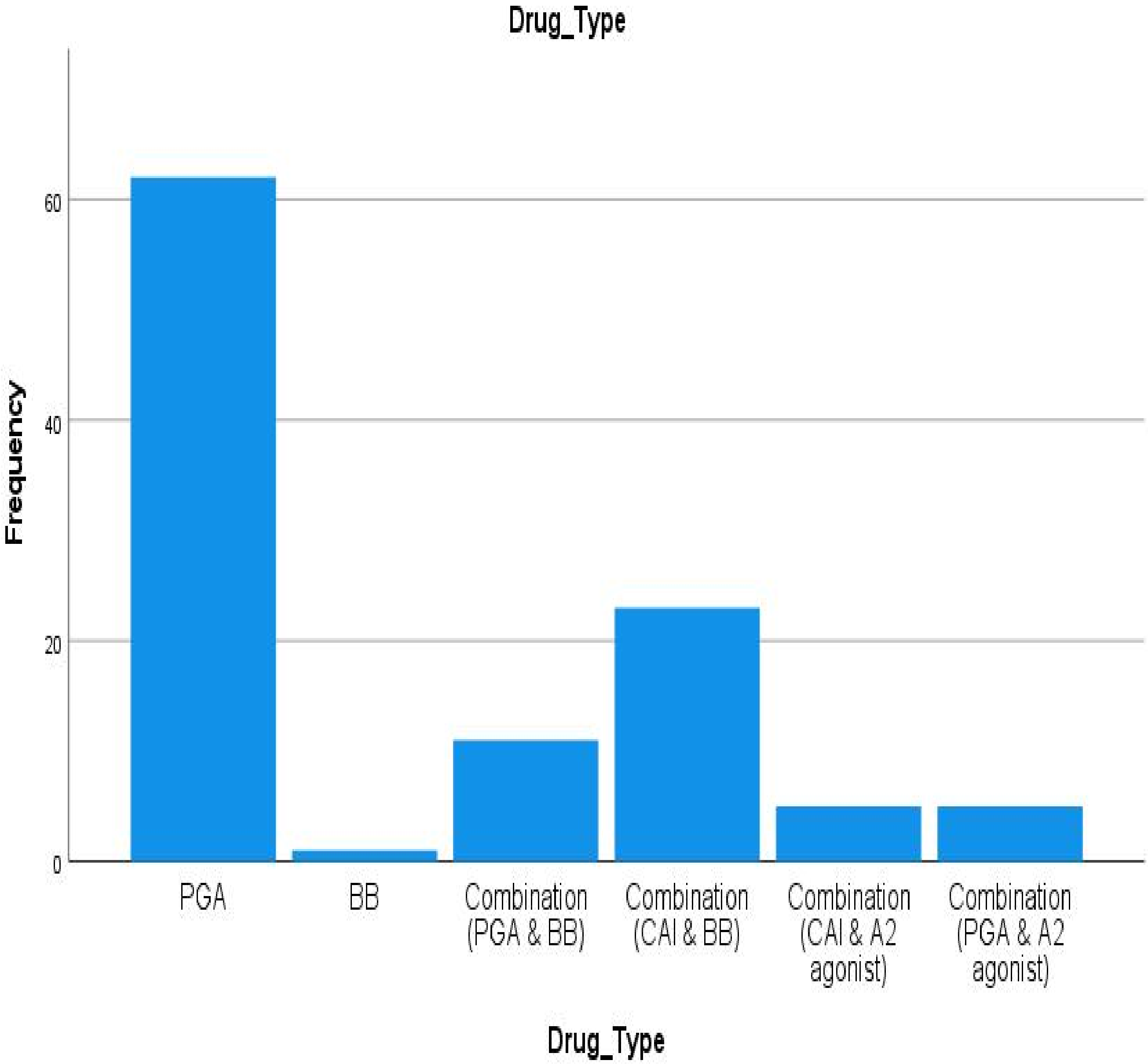
4.2 Data presentation for prescription pattern of doctors to x-ray how glaucoma diagnosis is managed

Table 3: Distribution of Drug Types Prescribed

DRUG TYPE	FREQUENCY (n)	PERCENTAGE (%)
PGA	62	57.9
BB	1	0.9
PGA & BB	11	10.3
CAI & BB	23	21.5
CAI & A2 Agonist	5	4.7
PGA & A2 Agonist	5	4.7
TOTAL	107	100

The table above showed that 57.9% (62) of the patients were prescribed PGA, 1 patient (0.9%) prescribed BB, 10.3% (11) prescribed PGA & BB, 21.5% (23) prescribed CAI & BB, 4.7% (5%) prescribed both CAI & A2 agonist and PGA & A2 agonist.

Fig. 5: Bar chart showing distribution of Drug Type



[From the data collected, PGA (Latanoprost or Travoprost) were the most commonly prescribed anti-glaucoma drugs with 57.9% (62), CAI & BB following with 21.5% (23), PGA & BB with 10.3% (11), CAI & A2 agonist with and PGA & A2 agonist with 4.7% (5) each, while BB with 0.9% (1) only.]

Table 4: Distribution of Drug Class (Monotherapy vs Combined)

	FREQUENCY (n)	PERCENTAGE (%)
Monotherapy	63	58.9
Fixed Combination	44	41.1
Total	107	100

Monotherapy was the most popular prescription regime with 58.7% (67), and fixed combination with 41.1% (44).

Table 5: Distribution of Frequency of Administration

	FREQUENCY	PERCENTAGE (%)
ONCE DAILY	1	0.9
B.I.D	33	30.8
TDS	1	0.9
NOCTE	72	67.3
TOTAL	107	100

Night-only (Nocte.) dosing was the most popular dosing frequency with 67.3% (72), B.I.D following with 30.8% (33), TDS and Once daily (for tabs) with 0.9% (1).

Table 6: Duration of Drug Prescription

	FREQUENCY (n)	PERCENT (%)
LONGTERM	96	89.7
1 & 2	11	10.3
TOTAL	107	100

Keys: (1) long-term (2) short-term

Table 7: Method of Drug Administration

	FREQUENCY (n)	PERCENTAGE (%)
TOPICAL	91	85.0
1 & 2	16	15
TOTAL	107	100

Keys: (1) Topical (2) Oral

4.3 Data Presentation on factors for non-adherence to glaucoma management

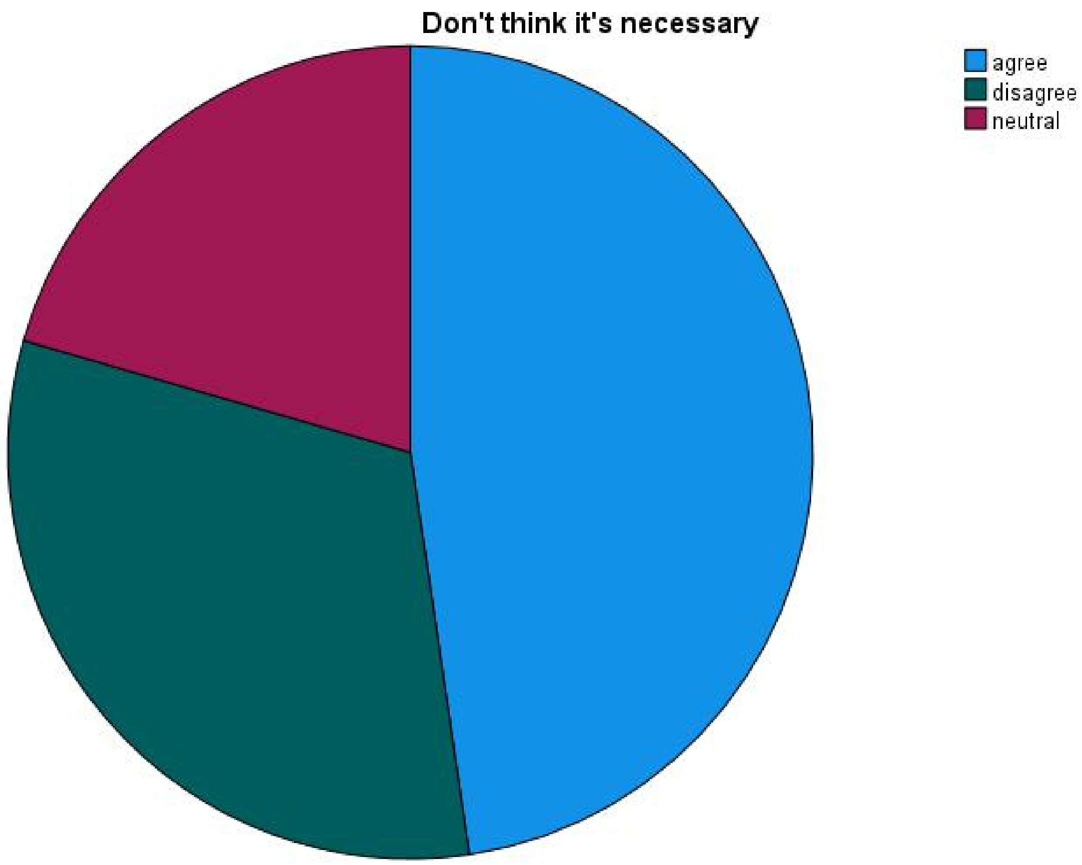
[Distribution of factors for non-adherence to glaucoma medications]

Table 8: Forgetfulness as a Factor for Non-adherence

	FREQUENCY (n)	PERCENTAGE (%)
AGREE	72	67.3
DISAGREE	28	26.2
NEUTRAL	7	6.5
TOTAL	107	100

The above shows that 72 (67.3%) of the patients agreed that "forgetfulness" is a factor for non-compliance, while 28 (26.2%) disagreed and 7 (6.5%) patients remained neutral.

Fig. 7: Pie Chart showing "Don't think it's necessary" as a factor for Non-adherence

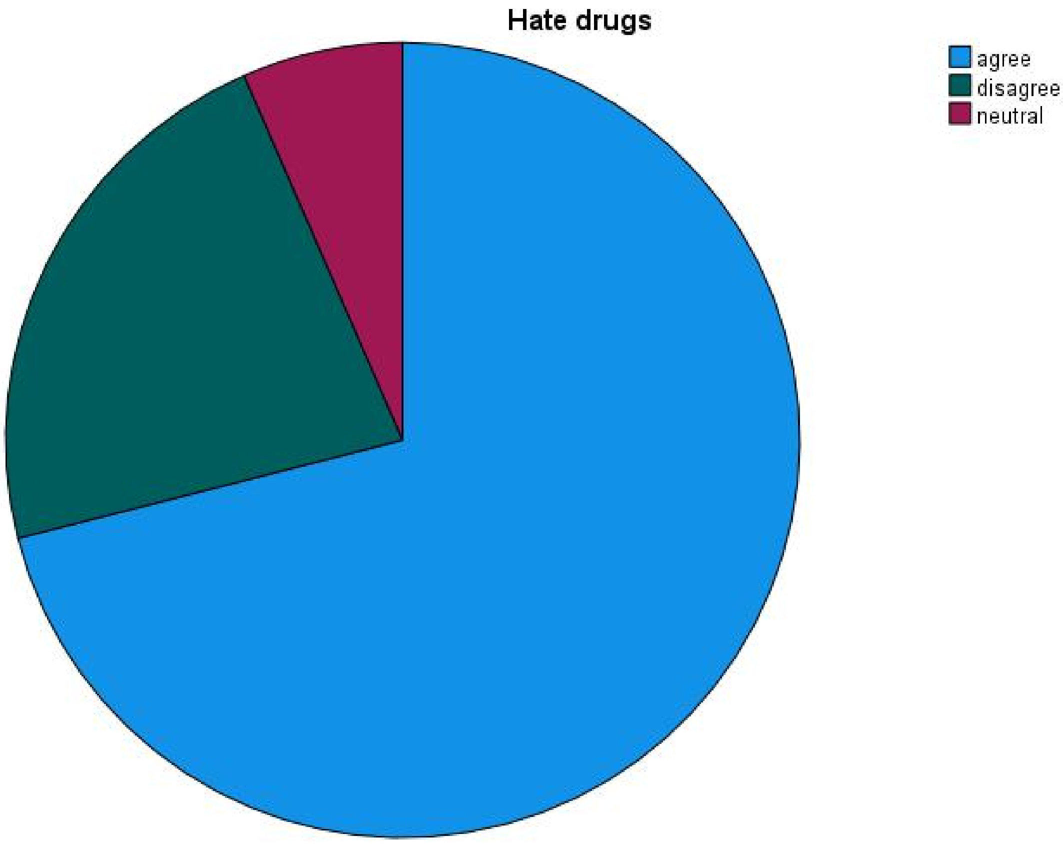


The above shows that 51 (47.7%) of the patients agreed that "don't think it's necessary" is a factor for non-compliance, while 34 (31.8%) disagreed and 22 (20.6%) patients remained neutral.

Table 9: "Hate drugs" as a Factor for Non-adherence

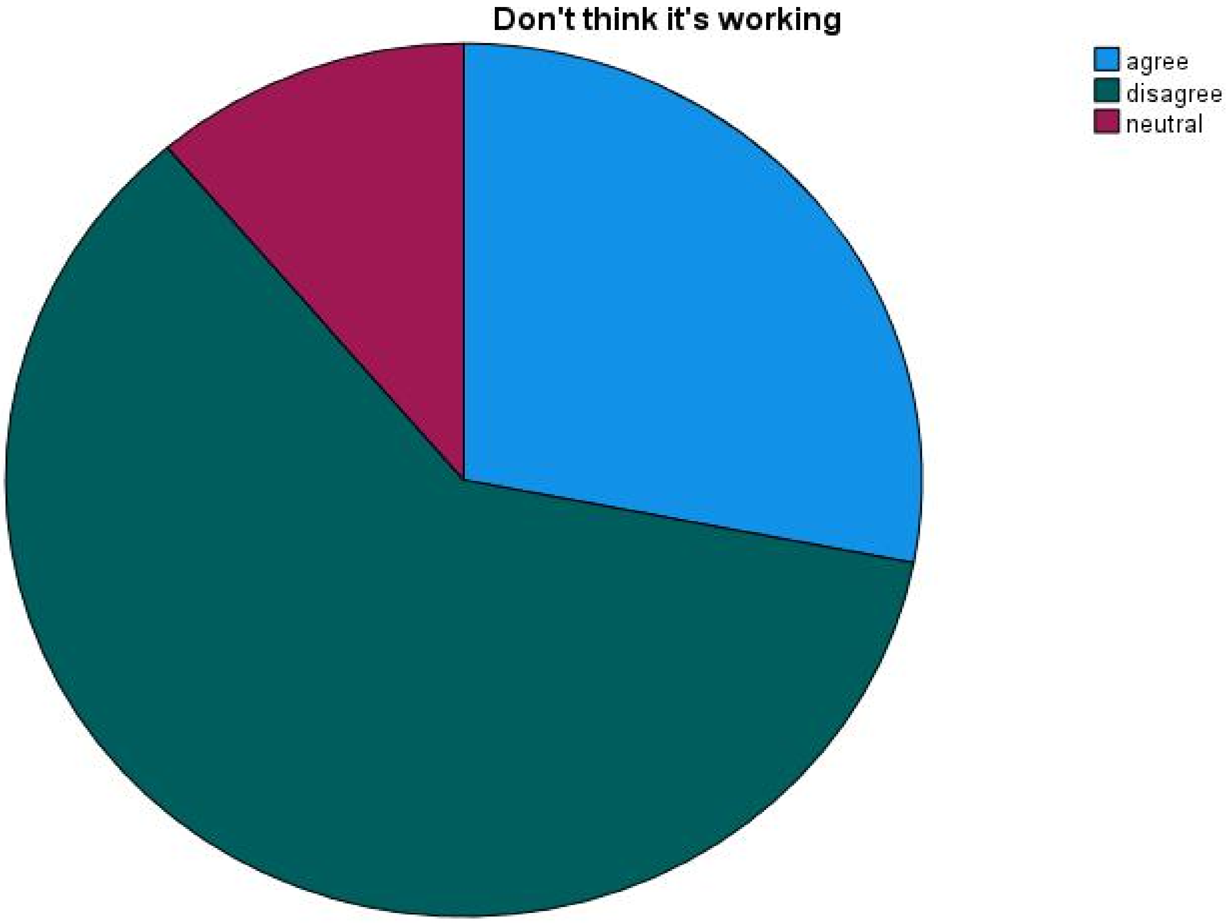
	FREQUENCY (n)	PERCENTAGE(%)
AGREE	76	71.0
DISAGREE	24	22.4
NEUTRAL	7	6.5
TOTAL	107	100

Fig. 8: Pie chart showing "Hate drugs" as a Factor for Non-adherence



The above shows that 76 (71.0%) of the patients agreed that "hate for drugs" is a factor for non-compliance, while 24 (22.4%) disagreed and 7 (6.5%) patients remained neutral.

Fig. 9: Pie chart showing "Don't think it is working" as a Factor for Non-adherence



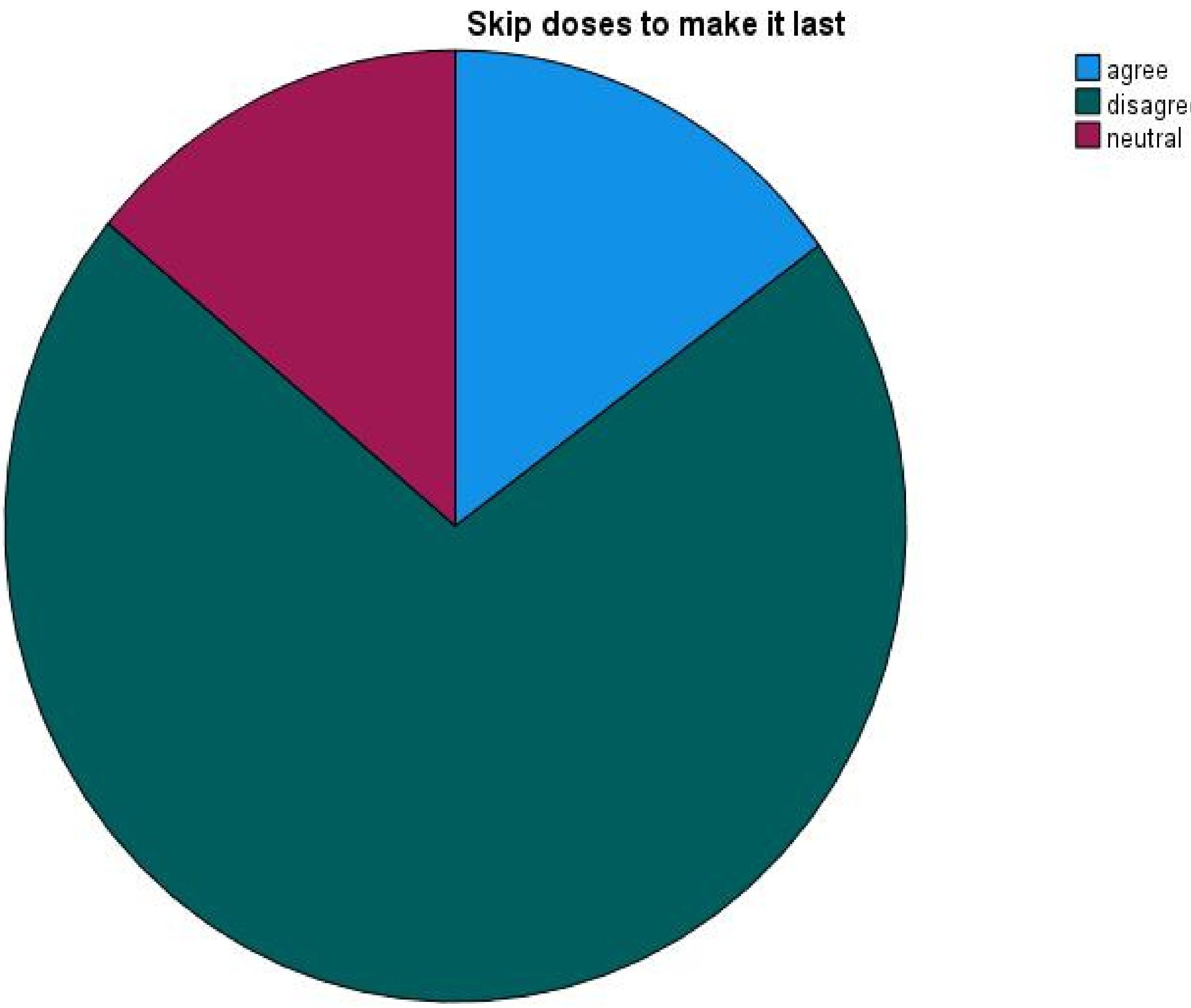
The above shows that 30 (28.0%) of the patients agreed that "don't think it is working" is a factor for non-compliance, while 65 (60.7%) disagreed and 12 (11.2%) patients remained neutral.

Table 10 “Unpleasant side effects” as a Factor for Non-adherence

	FREQUENCY (n)	PERCENTAGE(%)
AGREE	35	32.7
DISAGREE	40	37.4
NEUTRAL	32	29.9
TOTAL	107	100

The above shows that 35 (32.7%) of the patients agreed that “unpleasant side effects” is a factor for non-compliance, while 40 (37.4%) disagreed and 32 (29.9%) patients remained neutral.

Fig. 10: Pie chart showing "Skip doses to make it last" as a factor for Non-adherence



The above shows that 16 (15.0%) of the patients agreed that "skip doses to make it last" is a factor for non-compliance, while 76 (71.0%) disagreed and 15 (14%) patients remained neutral.

Table 11: “Too expensive for me” as a Factor for Non-adherence

	FREQUENCY (n)	PERCENTAGE(%)
AGREE	8	7.5
DISAGREE	85	79.4
NEUTRAL	14	13.1
TOTAL	107	100

The above shows that 8 (7.5%) of the patients agreed that “too expensive for me” is a factor for non-compliance, while 85 (79.4%) disagreed and 14 (13.1%) patients remained neutral.

Fig. 11 Pie chart showing distribution of "Don't like taking drugs" as a Factor for Non-adherence

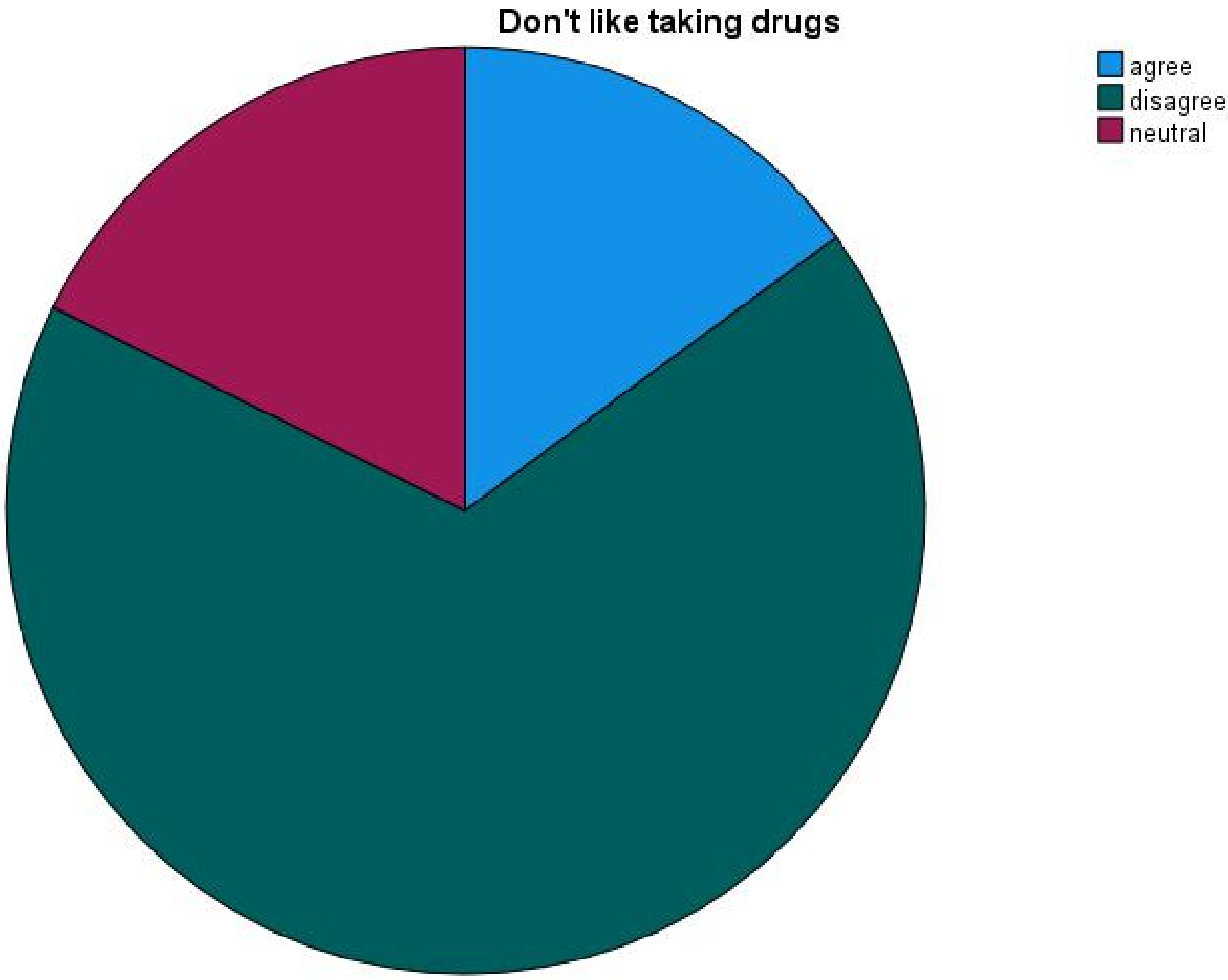


Table 12 “Don’t like drug dependency” as a Factor for Non-adherence

	FREQUENCY (n)	PERCENTAGE (%)
AGREE	75	70.1
DISAGREE	22	20.6
NEUTRAL	10	9.3
TOTAL	107	100

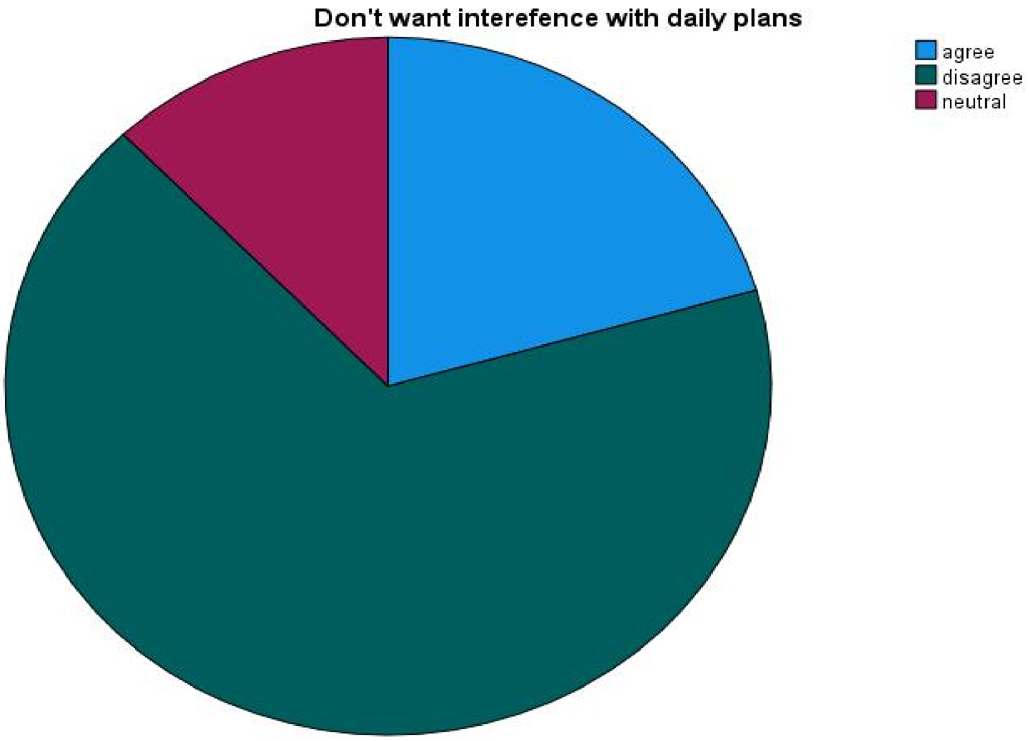
The above shows that 75 (70.1%) of the patients agreed that “don’t like drug dependency” is a factor for non-compliance, while 22 (20.6%) disagreed and 10 (9.3%) patients remained neutral.

Table 13 “Poor support from family” as a Factor for Non-adherence

	FREQUENCY (n)	PERCENTAGE (%)
AGREE	3	2.8
DISAGREE	101	94.4
NEUTRAL	3	2.8
TOTAL	107	100

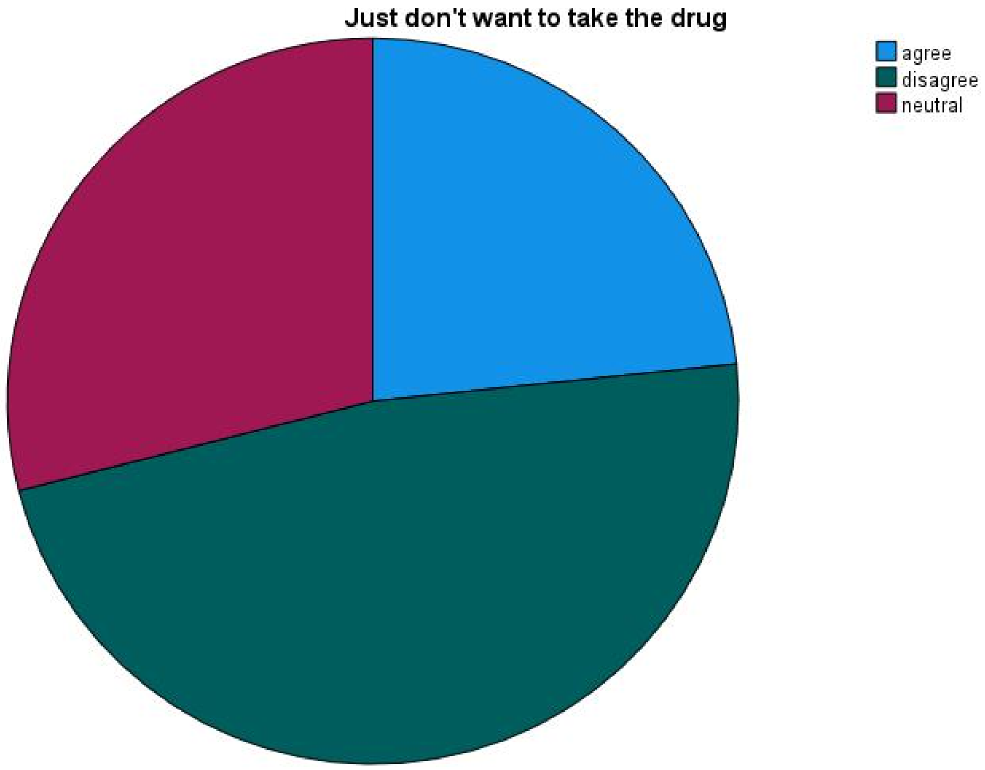
The above shows that 3 (2.8%) of the patients agreed that “poor support from family” is a factor for non-compliance, while 101 (94.4%) disagreed and 3 (2.8%) patients remained neutral.

Fig. 12: Pie chart showing "Don't want interference with daily plans" as a Factor for Non-adherence



The above shows that 22 (20.6%) of the patients agreed that "don't want to interfere" is a factor for non-compliance, while 72 (67.3%) disagreed and 13 (12.1%) patients remained neutral.

Fig. 14: Pie chart showing "Don't just want to take the drugs" as a Factor for Non-adherence



The above shows that 25 (23.4%) of the patients agreed that "don't just want to take the drugs" is a factor for non-compliance, while 51 (47.7%) disagreed and 31 (29.9%) patients remained neutral.

4.4 Inferential Statistics and presentation of results for the analysis of prescription pattern and medication adherence using Chi-square tests and logistic regression

Table 14: Computed Adherence Level Values Among Patients

ADHERENCE LEVEL	FREQUENCY (n)	PERCENTAGE (%)
Non-adherent (low)	70	65.4
Medium Adherent (medium)	32	29.9
Adherent (high)	5	4.7
TOTAL	107	100

Based on Medication adherence scale-12 (MAS-12) scoring, the majority of the patients were classified as non-adherent (65.4%, n=70), followed by moderately adherent (29.9%, n=32). Only 5 patients (4.7%) were classified as adherent.

Table 15: Comparison of Adherence across each drug classes

		NON-ADHERENT	MEDIUM ADHERENT	ADHERENT	TOTAL
DRUG TYPE	PGA	43	15	4	62
	BB	0	1	0	1
	COMBINATION (PGA & BB)	7	4	0	11
	COMBINATION (CAI & BB)	15	7	1	23
	COMBINATION (CAI & A2 AGONIST)	3	2	0	5
	COMBINATION (PGA & A2 AGONIST)	2	3	0	5

TOTAL					
		70	32	5	107

Adherence level across the drug types are as follows: PGAs; 43 were non-adherent, 15 medium adherent, and 4 adherent.BB; 0 were non-adherent, 1 medium adherent and 0 adherent. Combination of PGA and BB; 7 were non-adherent, 4 medium adherent and 0 adherent. Combination of CAI and BB; 15 were non-adherent, 7 medium adherent and 1 adherent. Combination of CAI and A2 Agonist; 3 were non-adherent, 2 medium adherent and 0 adherent. Combination of PGA and A2 Agonist; 2 were non-adherent, 3 medium adherent and 0 adherent.

(NOTE: PGA – Prostaglandin analogue, BB – beta blocker, CAI – Carbonic anhydrase inhibitor, A2 Agonist- Alpha-2 Agonist.)

4.5 Inferential Statistics

Adherence levels were recorded into two groups: non-adherent (low and medium adherence) and adherent (high adherence). This binary variable was then used for inferential analyses including Chi-square tests and logistic regression.

Chi-square tests were used to examine associations between prescription-related factors and adherence (collapsed into binary: adherent vs non-adherent).

4.5.1 Association between Drug Type and Adherence

Adherence levels were recorded into two groups: non-adherent (low and medium adherence) and adherent (high adherence). This binary variable was then used for inferential analyses including Chi-square tests and logistic regression.

Chi-square tests were used to examine associations between prescription-related factors and adherence (collapsed into binary: adherent vs non-adherent).

TABLE 16: SHOWING ASSOCIATION BETWEEN DRUG TYPE AND ADHERENCE LEVEL

DRUG TYPE		NON-ADHERENT	ADHERENT	TOTAL
	PGA	58	4	62
	BB	1	0	1
	COMBINATION(PGA& BB)	11	0	11
	COMBINATION(CAI& BB)	22	1	23
	COMBINATION(CAI& A2 AGONIST)	5	0	5
TOTAL	COMBINATION(PGA& A2 AGONIST)	5	0	5
		102	5	107
Pearson Chi –Square	Value = 1.524*	df = 5	2 sided Significance = 0.910	

From the result above, there is no significant association between drug type and adherence level, as $p = 0.910$ (i.e., $p > 0.05$).

Table 17: Association between Drug Class and Adherence Level

	ADHERENCE (BINARY)			
		Non-adherent	Adherent	Total
DRUG CLASS	Monotherapy	59	4	63
	Fixed Combination	43	1	44
TOTAL		102	5	107
Pearson Chi -Square	Value = 0.966*	df = 1	2 sided Significance = 0.326	

Adherence level across the drug Class is as follows: Monotherapy; 39 were Non-adherent, 4 adherent. Combined therapy; 43 were Non-adherent, 1 was adherent.

From the result above, there is no significant association between drug class and adherence level, as p = 0.326 (i.e., p > 0.05).

Table 18: Association between Frequency of Administration and Adherence level

		ADHERENCE (BINARY)		
		Non-adherent	Adherent	Total
FREQUENCY OF ADMINISTRATION	Once daily	1	0	1
	B.I.D	32	1	33
	TDS	1	0	1
	NOCTE	68	4	72
TOTAL		102	5	107
Pearson Chi-square	Value = 0.424*	df = 3	2 sided Significance = 0.935	

Adherence level across the drug Class are as follows: Once daily; 1 was Non-adherent, 0 adherent. B.I.D; 32 were Non-adherent, 1 was adherent. TDS; 1 was Non-adherent, 0 was adherent. NOCTE; 68 were Non-adherent, 4 were adherent.

From the result above, there is no significant association between drug class and adherence level, as $p = 0.935$ (i.e., $p > 0.05$).

Table 25: Logistic Regression (Uncollapsed Categories)

Non-adherent = 0 Adherent = 1

VARIABLES	FREQUENCY (n)	
DRUG TYPE	PGA	62
	BB	1
	PGA & BB	11
	CAI & BB	23
	CAI & A2 AGONIST	5
	PGA & A2 AGONIST	5
FREQ. OF ADMINISTRATION	Once daily	1
	B.I.D	33
	TDS	1
	NOCTE	72

DRUG CLASS	Monotherapy	63
	Fixed combination	44
Exp(B) = 0.049 df = 1		

TABLE 20: SHOWING RESULTS OF MODEL TEST USED TO ANALYZE RELATIONSHIP BETWEEN VARIABLES

		Df	Significance
DRUG TYPE	PGA	5	0.910
	BB	1	0.306
	PGA & BB	1	0.824
	CAI & BB	1	0.438
	CAI & A2 AGONIST	1	0.934
	PGA & A2 AGONIST	1	0.612
FREQ. OF ADMINISTRATION	Once daily	3	0.326
	B.I.D	1	0.935
	TDS	1	0.824
	NOCTE	1	0.591

DRUG CLASS	Monotherapy	1	0.824
	Fixed combination	1	0.765
Exp(B) = 0.049 df = 1			

The 2 Tables above shows Exp (B) value of 0.049. Thus the relationship between the variables DRUG TYPE, FREQUENCY OF ADMINISTRATION AND DRUG CLASS is statistically significant ($p < 0.049$).

[Exp(B) value of 0.049 is less than 0.05 (i.e. $p < 0.05$), hence chi square and regression analysis used to assess the association between the dependent variables(drug type, drug class, and frequency) and the independent variable (adherence level) is significant and so, accepted].

Table 21: Logistic Regression (Collapsed Categories)

	B	S.E	Wald	Df	Sig.	Exp(B)
Collapsed drug type	1.673	2.161	0.600	1	0.439	5.330
Collapsed_frequency	0.749	2.172	0.119	1	0.730	2.114
Constant	4.381	2.153	4.140	1	0.042	0.013

4.7 Summary of Results

- Prescription patterns at Metroeyes Clinic were consistent with international best practices, with PGAs and Nocte dosing frequency predominating.
- Adherence level was very poor, with only 4.7% classified as adherent. Inferential analysis found no significant association between prescription patterns and adherence, likely due to the very small number of adherent patients.
  - Drug type vs Adherence: $X^2 = 1.524$, df = 5, p = 0.910 => not significant.
  - Drug class (monotherapy vs combination) vs Adherence: $X^2 = 0.966$, df = 1, p = 0.326 => not significant.
  - Frequency of administration vs Adherence: $X^2 = 0.424$, df = 3, p = 0.935 => not significant.
- Most common barriers included forgetfulness (67.3% of respondents), dislike of drug dependency (70.1% of respondents), and perceived lack of necessity (47.7% of respondents).

CHAPTER FIVE

5.0 DISCUSSION

This chapter presents the findings of the study. It includes descriptive analyses of patients' socio-demographic characteristics, prescription patterns, and self-reported reasons for non-adherence. Inferential analyses (Chi-square tests and logistic regression) were performed to examine the association between prescription-related factors and medication adherence.

5.1 Sociodemographic of the respondents

The main aim of this study was to investigate the prescription patterns and medication adherence to glaucoma management among patients using Metroeyes Clinic Ikoyi as a case study.

A total of 107 patient records with glaucoma were reviewed. Of these, 54.2% (58 patients) were male, 45.8% (49) were female. The mean age was 55.6 years (18-80). The age group of patients are given thus; 18-20 (2 patients), 21-30 (5 patients), 31-40(8 patients), 41-50 (23 patients), 51-60 (25 patients) which was the mode age group, 61-70 (23 patients), 71-80 (21 patients). From the study, 15.9% of the patients had a family history of glaucoma, and 84.1% had a negative history of glaucoma. The most common type of glaucoma was Primary open angle accounting for 84.1% (90 patients), followed by primary angle closure glaucoma (11%, 10 patients) and Normal Tension glaucoma (2.8%, 3 patients); one patient with secondary glaucoma from diabetes, toxoplasmosis and Juvenile Onset glaucoma were also

included in this study. The distribution for the date of disease diagnosis were 9.3% for <1yr, 62.6% for between 2021 and 2024, 28.0% for before 2021.

5.2 PRESCRIPTION PATTERN

Treatment patterns were categorized according to the drug classes which were administered to the patients. Prostaglandin analogues (PGA) alone was the most preferred treatment method and used in 57.9% of the study population (62 patients); 21.5% (23 patients) were administered both a Carbonic anhydrase inhibitor and a beta-blocker i.e. CAI & BB; 10.3% (11 patients) were administered both a prostaglandin analogue and beta-blocker i.e. PGA & BB; 4.7% (5 patients) were administered both CAI & A2 agonist and PGA & A2 agonist respectively; while 0.9% (1 patient) was administered beta-blocker i.e. BB.

Patients with primary open angle glaucoma and normal tension glaucoma were most commonly prescribed PGA alone, while those with primary angle-closure glaucoma were most commonly administered both a CAI and beta-blocker. Regardless of disease severity, disease duration (either ≤12 months or >12 months), PGA alone was the most common treatment.

From the study, 67.3% (72 patients) were prescribed at night only (Nocte) dosing frequency; 30.8% (33 patients) were prescribed a twice daily dosing frequency; while 0.9% (1 patient) each was prescribed a once daily and thrice daily dosing frequency respectively.

With respect to treatment duration, the majority, 89.7% (96 patients) were prescribed long-term therapy, consistent with the chronic nature of glaucoma management. The vast majority 85% (91 patients) received topical medication alone, while 14% (15 patients) received both topical and oral medications.

5.3 MEDICATION ADHERENCE

Medication adherence of the 107 patients was evaluated. Patient-reported reasons for non-adherence were diverse. The most frequently cited barriers included:

- Forgetfulness (67.3%)
- Dislike of drug dependency (70.1%)
- General dislike of drugs (71.0%)
- Perceived lack of necessity (47.7%)
- Side effects (32.7%)

Less frequently reported barriers were cost of drug (7.5%) and the family support issues (2.8%). These findings highlight the predominance of behavioral and perpetual factors, rather than financial constraints, as primary drivers of poor adherence or non-adherence of patients in this study.

5.4 Summary of Findings

This study evaluated prescription patterns and medication adherence among glaucoma patients attending Metroeyes Clinic, Ikoyi. Descriptive analysis revealed that prostaglandin analogues (PGAs) were the most commonly prescribed medications (57.9%), consistent with international guidelines that recommend PGAs as first-line therapy due to efficacy and once-daily dosing convenience (European Glaucoma society, 2020; Ogunleye *et al., 2021*). The majority of prescriptions was monotherapy (58.9%) and predominantly administered nocte (67.3%), reflecting clinical preference for simplified dosing regimens.

In terms of adherence, the majority of patients was non-adherent (65.4%), with only 4.7% classified as adherent according to the MAS-12. This echoes Nigerian and African studies reporting poor adherence rates ranging from 21-40% (Akinsola *et al.,* 2023; Oluwatosin *et al.,* 2019; Aina *et al.,* 2018). Key factors influencing non-adherence in this study included forgetfulness, dislike of drug dependency and perceived lack of necessity, in line with earlier reports from Sleath *et al.* (2006), Patel & Spaeth (1995), and Quaranta *et al.* (2023).

5.5 Prescription Patterns and Adherence

Although PGAs and Monotherapy dominated prescribing, Chi-square and logistic regression analyses found no statistically significant association between prescription patterns (drug type, class, or dosing frequency) and adherence ($p > 0.05$ across all models). The logistic regression explained only 3.5% of adherence variance (Nagelkerke $R^2 = 0.035$), with no predictor emerging as significant.

This result differs from some international findings (e.g., Nordstrom et al., 2005; Kim et al., 2017), where drug class and regimen complexity were associated with adherence. A plausible explanation is the small number of adherent patients (n=5) in this dataset, which severely limited statistical power. With such an imbalance (95% non-adherent vs 5% adherent), regression models become unstable and unlikely to detect real associations, even if they exist.

Thus, while descriptive data highlighted rational prescription patterns**,** inferential statistics were underpowered to demonstrate statistically significant predictors of adherence.

5.6 Comparison with Previous Studies

- **Concordance:** The high prevalence of PGA use aligns with studies in Lagos and other urban Nigerian centers (Ogunleye et al., 2021) and international guidelines (EGS, 2020). The poor adherence rates match findings by Akinsola et al. (2023), Oluwatosin et al. (2019), and Adebayo & Salami (2020), reinforcing that non-adherence remains a major barrier in Nigeria.
- **Discordance:** Unlike Nordstrom et al. (2005) and Kim et al. (2017), this study did not find any significant associations between regimen complexity and adherence. This discordance may reflect contextual differences (Nigeria vs Developed countries), small adherent subgroup, or confounding by socioeconomic factors not fully captured here (e.g., drug cost, literacy level).

5.7 Limitations

- Small adherent subgroup (n=5) limited inferential power.
- Reliance on self-reported adherence (MAS-12) introduces recall and social desirability bias.
- Incomplete files reduced sample size (n=107).
- Communication gaps especially with the elderly.

5.8 Implications

Despite non –significant regression results, these findings remain important:

Prescription patterns were broadly rational and consistent with International Standards (PGA dominance & simplified dosing), but do not automatically translate into better adherence.

CHAPTER SIX

6.1 CONCLUSION

This retrospective study evaluated prescription patterns and medication adherence among glaucoma patients attending Metroeyes Clinic, Ikoyi, Lagos. The results showed that **Prostaglandin analogues (PGAs)** were the most frequently prescribed medications, with a preference for **monotherapy and once-nightly dosing.** These patterns are in line with international best practices, highlighting rational prescribing by clinicians.

Despite this, the majority of patients were **non-adherent (65.4%)**, with only a very small proportion classified as **adherent (4.7%)** on the MAS-12. Factors contributing to poor adherence included **forgetfulness, dislike for drug dependency, perceived lack of necessity, and side effects,** consistent with both Nigerian and global findings.

Statistical analyses (Chi-square and logistic regression) found **no significant association between prescription patterns (drug type, class, and frequency) and adherence levels.** This indicates that **rational prescription alone is insufficient to ensure good adherence.** The lack of statistical significance was likely influenced by the **very small number of adherent patients**, which limited the power of the inferential models.

Overall, this study concludes that **while prescribing patterns were clinically appropriate, medication adherence remained poor, and none of the tested prescription-related variables significantly predicted adherence.** Therefore, interventions to improve glaucoma outcomes in Nigeria should focus not only on drug choice but also on **addressing patient-related barriers to adherence.**

This study was limited by; it's relatively small sample size, the very small adherent subgroup, and reliance on self-reported adherence, which should be considered when interpreting the findings.

6.2 RECOMMENDATIONS

Based on the findings of this study, the following recommendations are proposed:

- Non-adherence was alarmingly high, demanding targeted interventions (patient education, reminder systems, cost reduction, family involvement).

- Future research could adopt using larger prospective samples with more balanced adherence categories, and incorporate socioeconomic and psychosocial predictors.

Clinical practice:

1. Enhanced patient education: Patients could be educated on the importance of strict adherence to glaucoma medications, the chronic nature of the disease, and the risks of poor compliance.
2. Counseling on drop instillation: Proper eye-drop instillation techniques should be demonstrated and reinforced at each visit to reduce wastage and improve effectiveness.
3. Simplified regimens where possible: Though once-nightly dosing with PGAs was common, clinicians could continue to minimize dosing frequency and poly-pharmacy to reduce patient burden.
4. Regular adherence monitoring: Incorporation of adherence screening (e.g., MAS-12, MMAS-8 or other validated tools) during clinic visits should be encouraged.

Health system/Policy

5. Drug affordability: Government and non-governmental organizations can work towards making anti-glaucoma medications, especially PGAs, more affordable through subsidy programs or inclusion in health insurance schemes.
6. Reminder and support systems: The use of digital reminders (SMS/WhatsApp alerts) or family/caregiver involvement could be adopted to support patients, especially the elderly.
7. Standardized guidelines: Adoption of unified glaucoma management guidelines across primary to tertiary eye care facilities in Nigeria to ensure consistency in care.

Research

8. Larger multi-center studies: Future research could work towards recruiting larger sample sizes to provide adequate statistical power and more balanced adherence categories.
9. Broader determinants: Future work may integrate socio-economic and psychosocial factors (e.g., education, income, health literacy) into predictive models of adherence.

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APPENDIX I

ETHICAL APPROVAL

DEPARTMENT OF OPTOMETRY
UNIVERSITY OF BENIN, BENIN CITY, NIGERIA.
RESEARCH AND ETHICS COMMITTEE

Date: 31st October, 2025.

EZEIFEDUBA IFEANYICHUKWU DANIEL,
Faculty of Optometry,
University of Benin, Benin City

Dear **EZEIFEDUBA IFEANYICHUKWU DANIEL,**

I write to inform you that you have been granted full ethical approval for you to carry out research project **"A RETROSPECTIVE STUDY ON PRESCRIPTION PATTERN AND MEDICATION ADHERENCE TO GLAUCOMA MANAGEMENT, METROEYES CLINIC IKOYI LAGOS AS A CASE STUDY".** The REC approval number is **EC/UBEN/LSC.OPT/25/147.** This is sequel to a successful ethical review of your submitted research protocols by the Research and Ethics Committee.

You are however expected to adhere strictly to internationally acceptable ethical standards relating to biomedical research involving humans and animals and at all times ensure that the rights, dignity and privileges of volunteering participants are upheld. Any amendments to this study protocol, unless urgently required to ensure the safety of participants, must be approved by REC prior to implementation.

We would appreciate receiving copies of all publications and excerpts arising from this study for filling and possible interventions. Please quote the reference number in all correspondence to this committee.

Thank you.

Dr. (Mrs.) Juno O. Okukpon
Project Coordinator

For:
Chair, Research and Ethics Committee
Faculty Of Optometry,
University Of Benin.

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Faculty of Optometry,
University of Benin,
28th October, 2025

The Chairperson
Research Ethics Committee (REC)
Faculty of Optometry,
University of Benin.

Through;
The Project Coordinator,
Faculty of Optometry.
University of Benin,
P.M.B 1154
Ugbowo, Benin City.

Dear Sir/Ma,

RE: APPLICATION FOR ETHICAL REVIEW AND CLEARANCE

I hearby apply for ethical clearance to conduct a research study titled:

"A RETROSPECTIVE STUDY ON PRESCRIPTION PATTERN AND MEDICATION ADHERENCE TO GLAUCOMA MANAGEMENT, METROEYES CLINIC IKOYI LAGOS AS A CASE STUDY."

This study aims to assess knowledge, attitude and practice of blue light blocking glasses among University of Benin students.

Principal investigator (PI):

Dr. (Mrs.) Sarah Ebuwa

Investigator:

Ezeifeduba Ifeanyichukwu Daniel
LSC1804324

I kindly request the Research Ethics Committee to provide the required application documents for completion and submission as part of the ethical review process.

Thank you for your consideration. I look forward to your favorable response.

Yours faithfully,

Ezeifeduba Ifeanyichukwu Daniel
LSC1804324
Investigator

INTELLECTUAL PROPERTY & TECHNOLOGY TRANSFER OFFICE (IPTTO)

Vice Chancellor's Office
University of Benin
PMB1154, Benin City, Nigeria

CLEARANCE FORM

DATE: 03-11-2025

NAME: EZEIFEDUBA IFEANYICHUKWU DANIEL

MATRIC NO: LSC1804324

DEPARTMENT: OPTOMETRY

FACULTY: OPTOMETRY

SESSION OF GRADUATION: 2024/2025

DIRECTOR
DATE
IPTTO (VCO

(Head of Unit (IPTTO))

APPENDIX

Case File Data Abstraction Form for Glaucoma Prescription Pattern

60

08034964407

SECTION A: Patient Information (Optional / De-identified for ethical compliance)

Case File ID: 68454

Age: 45

Sex: F

Family history of Glaucoma: Maternal Aunty

Diagnosis: Glaucoma

Type of Glaucoma: POAG

Date of Diagnosis: > 3years as of 2023

SECTION B: Prescription Pattern Details

S/N	Drug Name	Conc of drug	Drug Class	Frequency of Administration	Duration of Prescription	Method of Instillation	Route of Administration
1	Bricoma			BD		i	Topical
2	Misopt			BD		i	
3	Brimonidine						
4							

SECTION C: Notes & Observations

* Lack of Compliance noted on 26th sept, 2023 and resulted on Ised IOP checked that day. (26mmHg & 36mmHg for OD & OS resp)
* Claims good Compliance with Medications on 18th October 2023, IOP was 16mmHg & 12mmHg for OD & OS resp.
* IOP check on Subsequent R.T.C. remained within normal range.

II

Glaucoma Medication Adherence Questionnaire

Please indicate how much you agree or disagree with the following statements regarding your glaucoma medication. Tick the box that best represents your opinion.

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I sometimes forget to take my glaucoma medication.	☐ ✓	☐	☐	☐	☐
I don't think it's always necessary to take my glaucoma medication.	☐ ✓	☐	☐	☐	☐
I hate taking medications.	☐ ✓	☐	☐	☐	☐
I don't think the glaucoma medication is working.	☐	☐ ✓	☐	☐	☐
I experience unpleasant side effects from the medication.	☐	☐ ✓	☐	☐	☐
I skip doses so that the medication will last longer.	☐ ✓	☐	☐	☐	☐
The medication is too expensive for me.	☐	☐	☐	☐ ✓	☐
I don't like being told what to do, including taking medications.	☐	☐ ✓	☐	☐	☐
I don't like being dependent on medication.	☐	☐ ✓	☐	☐	☐

I have poor support from my caregivers or family regarding my treatment.	☐	☐	☐	☐ ✓	☐
I avoid medication because I don't want it to interfere with my plans.	☐	☐	☐	☐ ✓	☐
I just don't want to take the medication.	☐	☐	☐ ✓	☐	☐

(86)

Case File Data Abstraction Form for Glaucoma Prescription Pattern

08035757304

SECTION A: Patient Information (Optional / De-identified for ethical compliance)

Case File ID:

Age: 48

Sex: M.

Family history of Glaucoma:

Diagnosis: Glaucoma

Type of Glaucoma: ~~ACG~~ POAG with ↑IOP

Date of Diagnosis: 27/10/2021

SECTION B: Prescription Pattern Details

S/N	Drug Name	Conc of drug	Drug Class	Frequency of Administration	Duration of Prescription	Method of Instillation	Route of Administration
1	Xalatan		Prostaglandin	nocte		i	Topical
2	Midozol/ Misopt		CAI & β-blocker	BD		i	
3	Brimonidine		Alpha-2 Agonist	BD		i	
4							

SECTION C: Notes & Observations

Reported good Compliance on 7th April, 2022 and subsequent R.T.C

Brimonidine was added on December 31, 2024.

Glaucoma Medication Adherence Questionnaire

Please indicate how much you agree or disagree with the following statements regarding your glaucoma medication. Tick the box that best represents your opinion.

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I sometimes forget to take my glaucoma medication.	☐	☐	☐	☐ ✓	☐
I don't think it's always necessary to take my glaucoma medication.	☐	☐	☐	☐ ✓	☐
I hate taking medications.	☐	☐	☐	☐ ✓	☐
I don't think the glaucoma medication is working.	☐	☐	☐	☐ ✓	☐
I experience unpleasant side effects from the medication.	☐	☐	☐	☐ ✓	☐
I skip doses so that the medication will last longer.	☐	☐	☐	☐ ✓	☐
The medication is too expensive for me.	☐	☐	☐	☐ ✓	☐
I don't like being told what to do, including taking medications.	☐	☐	☐	☐ ✓	☐
I don't like being dependent on medication.	☐	☐	☐ ✓	☐	☐

99

Case File Data Abstraction Form for Glaucoma Prescription Pattern

08026264863

SECTION A: Patient Information (Optional / De-identified for ethical compliance)

Case File ID: 70496

Age: 50.

Sex: F

Family history of Glaucoma:

Diagnosis: Glaucoma

Type of Glaucoma: POAG

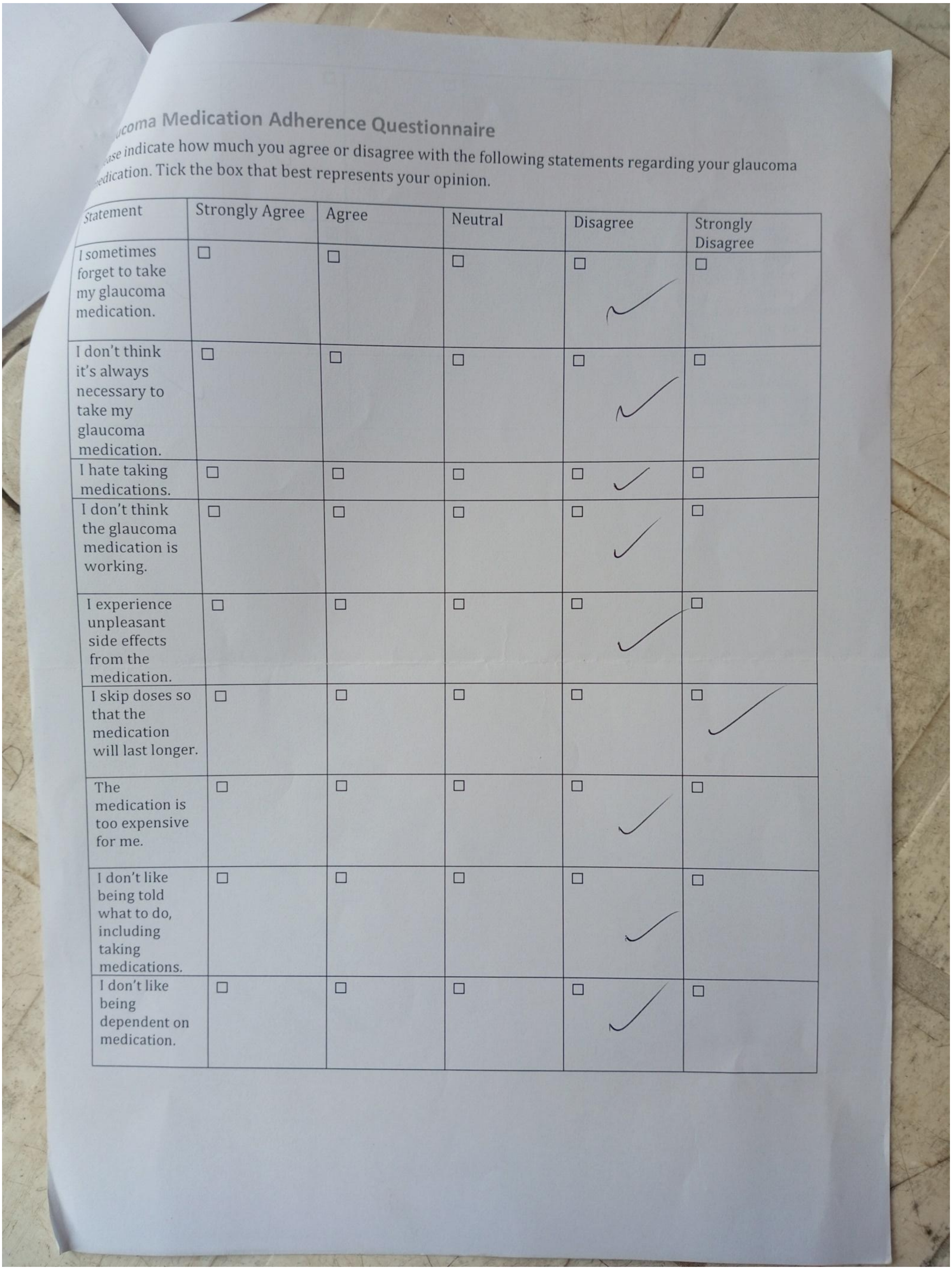
Date of Diagnosis: > 5yrs

SECTION B: Prescription Pattern Details

S/N	Drug Name	Conc of drug	Drug Class	Frequency of Administration	Duration of Prescription	Method of Instillation	Route of Administration
1	Xalatan			nocte	long term	1 drop	Topical
2	Brimonidine			Alpha-2 Agonist			
3							
4							

SECTION C: Notes & Observations

Claims good Compliance on 15/11/2023


...ucoma Medication Adherence Questionnaire

...ase indicate how much you agree or disagree with the following statements regarding your glaucoma ...edication. Tick the box that best represents your opinion.

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I sometimes forget to take my glaucoma medication.	☐	☐	☐	☐ ✓	☐
I don't think it's always necessary to take my glaucoma medication.	☐	☐	☐	☐ ✓	☐
I hate taking medications.	☐	☐	☐	☐ ✓	☐
I don't think the glaucoma medication is working.	☐	☐	☐	☐ ✓	☐
I experience unpleasant side effects from the medication.	☐	☐	☐	☐ ✓	☐
I skip doses so that the medication will last longer.	☐	☐	☐	☐	☐ ✓
The medication is too expensive for me.	☐	☐	☐	☐ ✓	☐
I don't like being told what to do, including taking medications.	☐	☐	☐	☐ ✓	☐
I don't like being dependent on medication.	☐	☐	☐	☐ ✓	☐

I have poor support from my caregivers or family regarding my treatment.	☐	☐	☐	☐ ✓	☐
I avoid medication because I don't want it to interfere with my plans.	☐	☐	☐	☐	☐ ✓
I just don't want to take the medication.	☐	☐	☐	☐	☐ ✓

APPENDIX III

Table 4.1.2: Frequency distribution of Patients by Age

Age	Frequency	Percent
18	2	1.9
23	1	0.9
24	1	0.9
26	1	0.9
27	2	1.9
32	1	0.9
33	1	0.9
37	1	0.9
39	2	1.9
40	3	2.8
42	1	0.9
43	1	0.9
44	2	1.9
45	3	2.8
46	1	0.9
47	7	6.5
48	6	5.6
50	2	1.9
53	3	2.8
54	2	1.9
55	5	4.7
56	3	2.8
58	2	1.9

59	6	5.6
60	4	3.7
61	2	1.9
63	2	1.9
64	2	1.9
65	1	0.9
66	3	2.8
67	3	2.8
68	2	1.9
69	2	1.9
70	6	5.6
72	2	1.9
73	1	0.9
74	3	2.8
75	3	2.8
76	2	1.9
77	2	1.9
79	4	3.7
80	4	3.7
Total	107	100.0

		Frequency	Percent	Valid Percent	Cumulative Percent
	less than 1 year	10	9.3	9.3	9.3
	between 2021 and 2024	67	62.6	62.6	72.0
	diagnosed before 2021	30	28.0	28.0	100.0

Total	107	100.0	100.0	

Drug type	Frequency	Percent	Valid Percent	Cumulative Percent
PGA	62	57.9	57.9	57.9
BB	1	0.9	0.9	58.9
Combination(PGA & BB)	11	10.3	10.3	69.2
Combination(CAI & BB)	23	21.5	21.5	90.7
Combination(CAI & A2 agonist)	5	4.7	4.7	95.3
Combination(PGA & A2 agonist)	5	4.7	4.7	100.0
Total	107	100.0	100.0	

	Frequency	Percent	Valid Percent	Cumulative Percent
Monotherapy	63	58.9	58.9	58.9
Fixed Combination	44	41.1	41.1	100.0
Total	107	100.0	100.0	

	Frequency	Percent	Valid Percent	Cumulative Percent
Once daily	1	0.9	0.9	0.9

	B.I.D	33	30.8	30.8	31.8
	TDS	1	0.9	0.9	32.7
	Nocte	72	67.3	67.3	100.0
	Total	107	100.0	100.0	

		Frequency	Percent	Valid Percent	Cumulative Percent
	Agree	72	67.3	67.3	67.3
	Disagree	28	26.2	26.2	93.5
	Neutral	7	6.5	6.5	100.0
	Total	107	100.0	100.0	

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Non-adherent(low)	70	65.4	65.4	65.4
	Medium adherent(medium)	32	29.9	29.9	95.3
	Adherent(high)	5	4.7	4.7	100.0
	Total	107	100.0	100.0	

Total

			Non-adherent	Medium adherent	Adherent	
Drug_Type	PGA	Count	43	15	4	62
		% within Drug_Type	69.4%	24.2%	6.5%	100.0%
	BB	Count	0	1	0	1
		% within Drug_Type	0.0%	100.0%	0.0%	100.0%
	Combination(PGA & BB)	Count	7	4	0	11
		% within Drug_Type	63.6%	36.4%	0.0%	100.0%
	Combination(CAI & BB)	Count	15	7	1	23
		% within Drug_Type	65.2%	30.4%	4.3%	100.0%
	Combination(CAI & A2 agonist)	Count	3	2	0	5
		% within Drug_Type	60.0%	40.0%	0.0%	100.0%
	Combination(PGA & A2 agonist)	Count	2	3	0	5
		% within Drug_Type	40.0%	60.0%	0.0%	100.0%
Total		Count	70	32	5	107
		% within Drug_Type	65.4%	29.9%	4.7%	100.0%

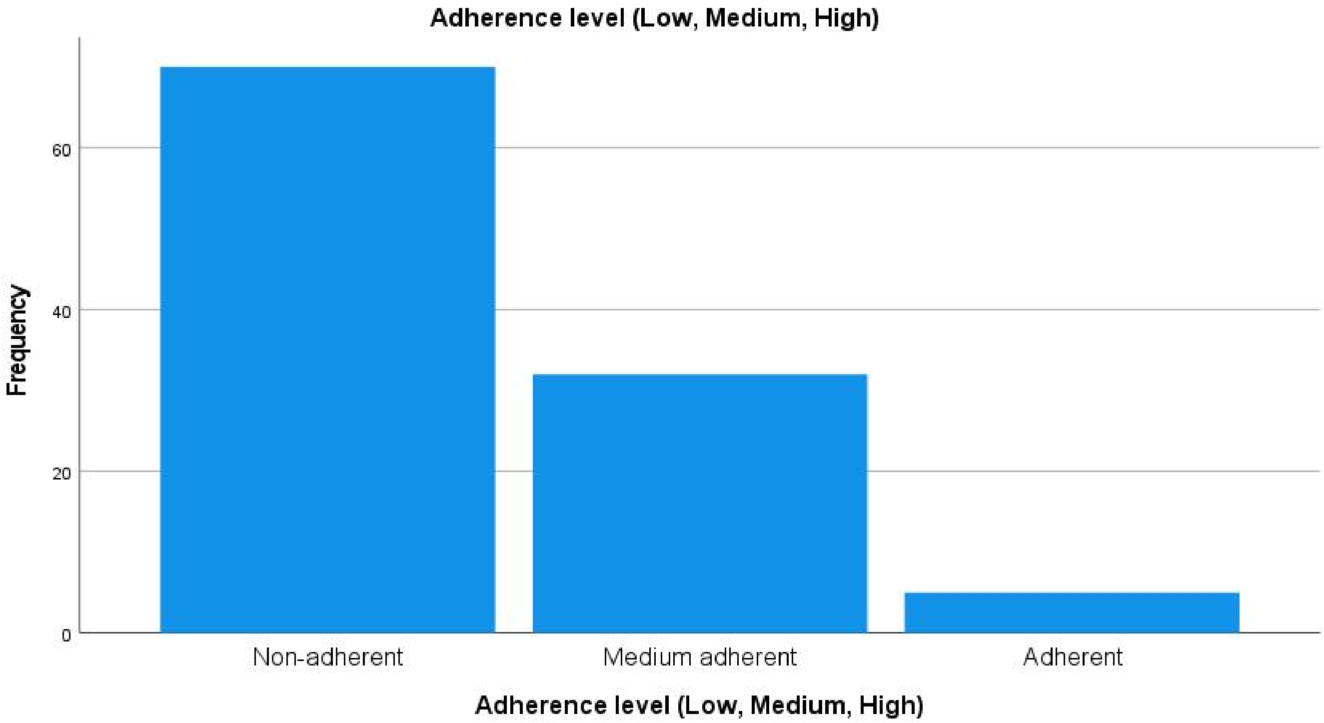
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	1.524[a]	5	0.910
Likelihood Ratio	2.507	5	0.775
Linear-by-Linear Association	1.001	1	0.317
N of Valid Cases	107		

a. 9 cells (75.0%) have expected count less than 5. The minimum expected count is .05.

	Value	df	Asymptotic Significance (2-sided
Pearson Chi-Square	1.524[a]	5	0.910
Likelihood Ratio	2.507	5	0.775
Linear-by-Linear Association	1.001	1	0.317
N of Valid Cases	107		

a. 9 cells (75.0%) have expected count less than 5. The minimum expected count is .05.

		Adherence (Binary)		
		Non-adherent	Adherent	Total
Drug_Class	Monotherapy	59	4	63
	Fixed Combination	43	1	44
Total		102	5	107



		Non-adherent	Adherent	Total
Drug_Type	PGA	58	4	62
	BB	1	0	1
	Combination(PGA & BB)	11	0	11
	Combination(CAI & BB)	22	1	23
	Combination(CAI & A2 agonist)	5	0	5
	Combination(PGA & A2 agonist)	5	0	5
Total		102	5	107

		Adherence (Binary)		
		Non-adherent	Adherent	Total
Freq_of_administration	Once daily	1	0	1
	B.I.D	32	1	33
	TDS	1	0	1
	Nocte	68	4	72
Total		102	5	107

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	0.424[a]	3	0.935
Likelihood Ratio	0.538	3	0.911
Linear-by-Linear Association	0.373	1	0.541
N of Valid Cases	107		

a. 6 cells (75.0%) have expected count less than 5. The minimum expected count is .05.

LOGISTIC REGRESSION (UNCOLLAPSED)		Frequency
Drug_Type	PGA	62
	BB	1
	Combination(PGA & BB)	11
	Combination(CAI & BB)	23
	Combination(CAI & A2 agonist)	5
	Combination(PGA & A2 agonist)	5

Freq_of_administration	Once daily	1
	B.I.D	33
	TDS	1
	Nocte	72
Drug_Class	Monotherapy	63
	Fixed Combination	44

Variables in the Equation

		B	S.E.	Wald	Df	Sig.	Exp(B)
Step 0	Constant	3.016	0.458	43.343	1	.000	0.049

Variables not in the Equation[a]

			Score	df	Sig.
Step 0	Variables	Drug_Type	1.524	5	0.910
		Drug_Type(1)	1.047	1	0.306
		Drug_Type(2)	0.049	1	0.824
		Drug_Type(3)	0.601	1	0.438
		Drug_Type(4)	0.007	1	0.934
		Drug_Type(5)	0.257	1	0.612
		Drug_Class(1)	0.966	1	0.326
		Freq_of_administration	0.424	3	0.935
		Freq_of_administration(1)	0.049	1	0.824
		Freq_of_administration(2)	0.289	1	0.591
		Freq_of_administration(3)	0.049	1	0.824

a. Residual Chi-Squares are not computed because of redundancies.

Variables not in the Equationa

	Score	df	Sig.

Step 0	Variables	Drug_Type	1.524	5	0.910
		Drug_Type(1)	1.047	1	0.306
		Drug_Type(2)	0.049	1	0.824
		Drug_Type(3)	0.601	1	0.438
		Drug_Type(4)	0.007	1	0.934
		Drug_Type(5)	0.257	1	0.612
		Drug_Class(1)	0.966	1	0.326
		Freq_of_administration	0.424	3	0.935
		Freq_of_administration(1)	0.049	1	0.824
		Freq_of_administration(2)	0.289	1	0.591
		Freq_of_administration(3)	0.049	1	0.824

a. Residual Chi-Squares are not computed because of redundancies.

Omnibus Tests of Model Coefficients

		Chi-square	Df	Sig.
Step 1	Step	2.598	8	0.957
	Block	2.598	8	0.957
	Model	2.598	8	0.957

Categorical Variables Codings

LOGISTIC REGRESSION (COLLAPSED CATEGORY)		Frequency	Parameter coding (1)
Drug_Class	Monotherapy	63	1.000
	Fixed Combination	44	.000
Collapsed_frequency	once daily and above	35	1.000
	nocte only	72	.000
Collapsed drug type groups	Monotherapy	63	1.000
	Combination therapy	44	.000

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-3.016	.458	43.343	1	.000	0.049

Variables not in the Equation[a]

			Score	df	Sig.
Step 0	Variables	Collapsed drug type groups(1)	0.966	1	0.326
		Collapsed_frequency(1)	0.385	1	0.535
		Drug_Class(1)	0.966	1	0.326

a. Residual Chi-Squares are not computed because of redundancies.

Contingency Table for Hosmer and Lemeshow Test

		Adherence (Binary) = Non-adherent		Adherence (Binary) = Adherent		
		Observed	Expected	Observed	Expected	Total
Step 1	1	10	9.876	0	0.124	10
	2	33	33.124	1	0.876	34
	3	59	59.000	4	4.000	63

Expected values, Chi-square and CI @ 95%

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
								Lower	Upper
Step 1[a]	Collapsed drug type groups(1)	1.673	2.161	0.600	1	0.439	5.330	0.077	367.966
	Collapsed_frequency(1)	.749	2.172	0.119	1	0.730	2.114	0.030	149.280
	Constant	4.381	2.153	4.140	1	0.042	0.013		

a. Variable(s) entered on step 1: Collapsed drug type groups, Collapsed_frequency.